Columbia-Presbyterian Medical Center Annual Report 1982

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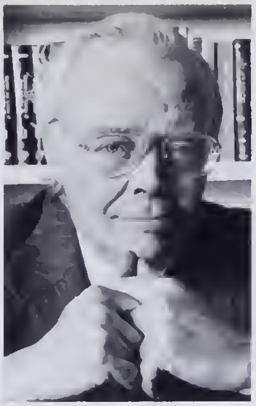
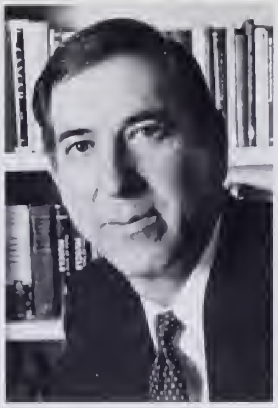
Michael I. Sovern, President, Columbia University

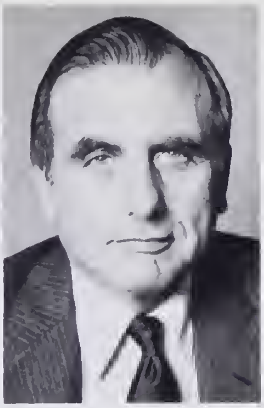
Felix E. Demartini, M.D. President of The Presbyterian Hospital



Donald F. Tapley, M.D. Dean of the Faculty of Medicine, Columbia University



Robert F. Goldberger, M.D. Provost and Vice President for Health Sciences, Columbia University



Edward H. Noroian, Executive Vice President of The Presbyterian Hospital

Columbia-Presbyterian Medical Center Combined Annual Report

This past year, The Presbyterian Hospital and Columbia University refined their long-range plans for the Columbia-Presbyterian Medical Center, particularly for the modernization of The Presbyterian Hospital and the creation of networks connecting patient care, research and teaching programs at the Medical Center with the local community, as well as related programs throughout the region and the world.

It is a major challenge to enhance and expand patient care services, teaching and research programs at a time when financial support for these activities is being frozen or cut back. The Medical Center is determined to meet this challenge with confidence in our ability to discover or create new resources while developing to the greatest extent those traditional sources of strength that have served us so well in the past—not just fiscal support but even more significantly, such human resources as our concerned and dedicated trustees, physicians and employees, alumni, donors and friends in the community.

In 1982, the long-range planning process began to lead to a more concrete vision of what our Medical Center will be like over the next 25 years.

Inpatient facilities at the Medical Center would be reduced in size somewhat (by 100 beds) and the remaining facilities would be consolidated and modernized, either through replacement or renovation. The goal would be to enhance our ability to provide complex medical care for patients from the local community, surrounding areas and beyond, by streamlining our physical facilities and maximizing our high technology programs.

The hub of the modernized center would be on Fort Washington Avenue. New adult facilities would be located on the west side of the street, adjacent to the Atchley Pavilion, and renovated adult inpatient facilities would be based primarily in the Harkness Pavilion. A system of bridges and connectors would link the two. With the joining last year of the Babies Hospital and Sloane Hospital for Women Divisions of The Presbyterian Hospital into a new Center for Women and Children, the Medical Center already is able to offer the finest in pediatrics and maternity care under a single roof. The completion of the "shell floors" in the Babies Hospital building and the joining of pediatrics and obstetrics/gynecology were accomplished as part of the priority projects program, but more work remains to be done: expanded high-technology services for children would be added as part of the Hospital's overall modernization plan, and support services for adults and children would be located on a common level in vacated space linking the Center for Women & Children with the modernized facilities for adults on Fort Washington Avenue.

Also included in the program is an innovative community health network: a 300-bed community hospital; an 80-bed nursing home specializing in geriatrics, geriatric psychiatry and rehabilitation; a home care program; and a plan to "seed" the community with new primary care doctors. Each of these community programs provides local patients with lower-cost alternatives to inpatient care at the Medical Center. In addition, by consolidating services to eliminate built-in staffing inefficiencies and high maintenance and energy costs, the planners have determined that the modernized facilities at the Med-

ical Center will virtually pay for themselves in operating cost savings over the 25-year life span of the program.

As the Hospital was preparing to physically reorganize its facilities, the University continued to explore new ways of enhancing research and teaching programs. The University's new Office of Science and Technology Development, for example, is actively developing new sources of revenue for University programs. Joint ventures with industry could help Columbia's Health Sciences Division offset budgetary restraints due to changing governmental funding policies, and devices and equipment developed by Health Sciences Faculty could become an increasingly important source of revenue.

In an effort to bring a multidisciplinary approach to bear on some of the complex social issues involved in medical education, research and health care today, the University has established a new Center for Society and Medicine, and has elected as its director the first Bernard Schoenberg Professor of Social Medicine.

A cooperative effort between the Hospital and the University has led to the establishment of Columbia-Presbyterian Medical Associates/East Side at 38 East 61st Street in midtown Manhattan. This new doctors' office facility will be used by approximately 70 members of the Medical Center staff. The new off-site practice, which is the third for Columbia-Presbyterian Medical Center, will provide specialty ambulatory care closer to home for patients from the East Side of Manhattan.

The Hospital also is looking for innovative ways of developing new sources of revenue to support patient care activities. A new affiliate, Presbyterian Computer Services Corp., recently was formed to market our "census management" program and other software developed here.

In 1982 the State of New York opened a new facility for psychiatric research at the Columbia-Presbyterian Medical Center. The Lawrence C. Kolb Research Laboratories, a 15-story facility linked to the New York State Psychiatric Institute building, was dedicated on October 1. With this addition the Institute, an integral part of the Medical Center, becomes the largest non-federal psychiatric research facility in the nation.

Recently, at The Presbyterian Hospital, Howard L. Clark was elected Chairman of the Board, succeeding Thomas H. Choate and John W. Brooks, Co-Chairman. Mr. Clark, former president, chief executive officer and chairman of American Express, has been on the Board since 1960.

In assuming the leadership of the Board of Trustees, Mr. Clark said that he planned to build upon the success of Mr. Choate and Mr. Brooks in restoring the Hospital to fiscal health, and that he looked forward to working with management to address the challenges to be faced in securing the future of the Medical Center. Mr. Choate and Mr. Brooks, who have served the Hospital for a combined total of nearly 30 years, will remain on the Board as Trustees.

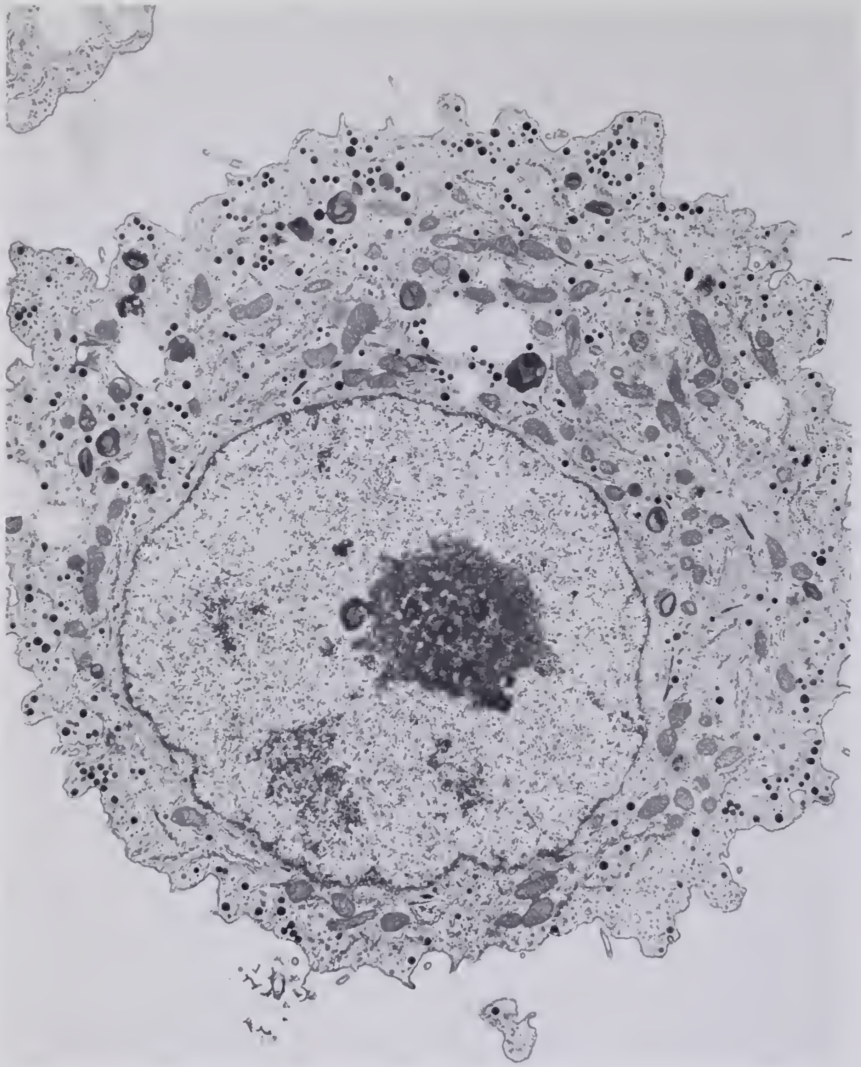
Samuel L. Higginbottom, President of Rolls-Royce, Inc., was elected Chairman of the Board of Trustees of Columbia.

REPORTS OF DEPARTMENTS

Anatomy and Cell Biology

Research and teaching remain the major activities of the Department. Last year, however, the Department's mission changed from that of a general anatomy department to one with a new focus on the emergent field of cell biology. This basic shift in direction has been accompanied by a significant planning and recruitment effort. Three new faculty members, all cell biologists, have been recruited, and two more are being sought, at least one of whom will be a cellular neurobiologist. The Department also is setting up core facilities and renovating space to enhance cell biology research.

In the search for faculty the desirability of a Columbia appointment became apparent: 200 people sent credentials and 40 were interviewed. The three new faculty arriving next year have been working at prestigious institutions and in the laboratories of notable cell biologists. One has been using vesicular stomatitis virus as a probe to examine the route and molecular mechanisms of incorporation of proteins into the plasma membranes of cells; the second has been investigating the processing of the oligosaccharide components of lysosomal glycoproteins, work which is critical to the understanding of how newly synthesized lysosomal enzymes are routed from the Golgi apparatus to lysosomes. The third new member of the faculty has acquired considerable recognition for his work on the genetics and development of the slime mold *Dictyostelium* and has developed two powerful new tools for the further exploration of this model. He is now investigating the role of



cyclic nucleotides in *B. pertussis* and the resulting whooping cough.

The research of current faculty continues to go well. Despite national cutbacks in funding for biomedical research, the Department has largely maintained its external funding and in some cases even expanded it.

A major theme, currently being enlarged, is the development of the nervous system. Focusing on the sea slug, *Aplysia*, faculty have succeeded in removing single identified neurons and growing them in culture. This has permitted them to analyze not only the patterns of interconnections formed between identified neurons *in vitro* (and the factors responsible) but also the biochemical changes induced in follower cells by the establishment of synaptic connections. Others have been examining the mechanisms involved in the commitment of neural crest cells to the neuronal lineage, the migration of a subset of these cells to the bowel, where they give rise to the enteric nervous system, and the role of the microenvironment in determining their final phenotypic expression defined by selection of a neurotransmitter.

A colony of mutant mice that develops a condition analagous to Hirschprung's Disease, a human congenital disorder, has been established. Study of these mutants has disclosed that the microenvironment of the wall of the gut is critical to both normal and abnormal development, and further analysis should lead to identification of the relevant microenvironmental molecules.

Insight is being sought into the basic mechanisms of the development of cell lineages in the nervous system as they become established at the stage of neurulation, as well as the pathogenic mechanisms that lead to defects of closure of the neural tube, as in spina bifida. The growth of axons during development, the factors responsible for their correct guidance to target structures, and the mechanism of insertion of new membrane are being examined at the molecular level.

Other faculty are investigating the morphological and molecular events that accompany the remodeling of growth cones into synapses as well as the guidance of growing axons to target neurons, and have discovered evidence of a novel means of cellular interaction—a matter of considerable significance to developmental neuroscience.

A series of elegant immunocytochemical studies of luteinizing hormone releasing hormone (LHRH)-containing neurons and vasopressin-containing neurons has suggested the existence of a wholly novel type and location of neuroendocrine phenomenon. This and other significant observations are now being related to mechanisms of gonadotrophin release, control of sexual behavior, and sexual dimorphism in the brain.

Another focus of departmental research has been on muscle biophysics. Among various aspects under study are the arrangement of the filaments that comprise the contractile apparatus of skeletal muscle and the mechanism by which calcium ions regulate contractility of skeletal muscle—studies which should provide fundmental insights into how muscles generate tension. Other work is designed to relate the structure of muscle membranes to the contractile process.

Computer-assisted mathematical modeling of the kinematics of skeletal growth behavior shows considerable promise in the investigation of the determination of

cranial shape and shape change under normal and abnormal conditions. Mathematical models of "chance" processes in biological events have been developed for the first time and extended to study of general questions of pattern formation of skeletal elements during both ontogeny and phylogeny.

Non-developmental work includes examination of the cellular biology of enteric serotonergic neurons and of the post-translation processing and routing of membrane glycoproteins to the plasma membranes of identified neurons of *Aplysia,* a study that will correlate well with the work of the incoming cell biologists. Another investigation is directed toward the previously unsuspected function of biogenic amines as locally acting hormones in the endocrine glands rather than as neurotransmitters.

Goals for the coming year include completion of the recruitment effort and the redesign of two major courses. The Microscopic Anatomy Course will be modified to reflect the new faculty's talents and to put more emphasis on small group teaching. The Neuroanatomy section of the Neuroscience course will be revised to introduce students to the subject during their first year and familiarize them with the general outline of the gross anatomy of the brain early in their education. This in turn will permit more extensive exploration of systems in the second year Neuroscience course. Finally, a major effort will be directed toward teacher training.

Anesthesiology

Anesthesiology is fully involved in the traditional triad of activities of a medical center: patient care, teaching and research, both clinical and basic.

As the three areas have advanced, anesthesiologists are fast approaching the time when they can provide nearly fail-safe anesthesia for low-risk patients. These advances also have made the benefits of surgery available to patients so severely ill that just a few years ago they would have been considered unable to survive anesthesia.

In recovery room and intensive care units the anesthesiologist participates in overall patient care and assumes particular responsibility for the support of vital functions. Here again, the same theme recurs: anesthesiologists are approaching the time when respiratory support, provided in the appropriate setting, can be made fail-safe, allowing respirators to be used preventively.

In the last three years the Anesthesiology Service has significantly expanded its involvement in the care of inpatients and outpatients with chronic and intractable pain. Between January 1982 and December 1982, 419 patients were evaluated and treated. These patients, suffering from a wide variety of clinical syndromes, received treatments ranging from nerve blocks and other medication to transcutaneous electrical stimulation, relaxation training and teaching of corrective exercises and coping skills.

Because of its complex technological requirements, modern anesthesia has to rely on continuous and close technological support. The monitoring and technology unit of the Service sets up and operates electronic monitoring equipment in operating rooms, calibrates and checks performances of all equipment, designs and builds special interconnecting devices to assure compatibility of the many different types of equipment in use, and carries out periodic electrical safety tests and preventive maintenance procedures. Another important function of the unit is to prepare instruction manuals and to teach physicians, nurses and other personnel how to properly use monitoring equipment. The unit also is responsible for adherence to applicable codes, standards and regulations, and carries out a number of research and development tasks.

During the past year basic and clinical research has been supported by the National Institutes of Health and Hoffman-La Roche, Inc. In collaboration with many other departments and institutions, an array of important and interesting research has been conducted.

Studies of the effects of anesthetics on central nervous system receptors using specific radioisotope tracers continued. Research into the analgesic actions of anesthetics and the possible role of the opiate receptor-enkephalin system also continued.

The effects of halothane on adenylate cyclase activity of the heart and the liver is also being investigated.

In collaboration with Psychiatry, work is continuing in understanding pain, applying the sensory decision theory. Investigations of the mechanism of action of volatile anesthetics on cyclic nucleotides and beta-adrenergic receptors is also underway.

Studies are being conducted in collaboration with several other institutions on the pharmacokinetics of nondepolarizing muscle relaxants in man, and on the role of environmental factors in the regulation of drug and carcinogen metabolism.

In conjunction with Pediatrics, the effects of endogenous vasoactive mediators on lung blood flow and lymph flow are underway. Also in collaboration with Pediatrics, the perinatology research group continues to study the role of vasoactive mediators in homeostasis in the fetus and newborn. Other pediatricians are working with Anesthesiology to analyze mortality and morbidity in infants, especially in infants weighing less than 1000 grams at birth. In collaboration with the Pediatric Pulmonary Division, Anesthesiology is studying the noninvasive measurement of pulmonary diffusion capacity in children with thalassemia major.

The quality of applicants to the residency program continues to improve, reflecting that, once again, Anesthesiology is recognized as having one of the leading programs in the country.

Anesthesiology's residency training program continues to offer four years of training starting with the first year out of medical school.

The clinical service here stresses that residents are trained to head anesthetic teams, not just to perform solo practice. As part of team concept, certified registered nurse anesthetists and monitoring technicians have been incorporated into anesthethic teams, headed by physician anesthesiologists. Management of the critically ill patient is emphasized not only in the operating room, but also in recovery rooms and intensive care units.

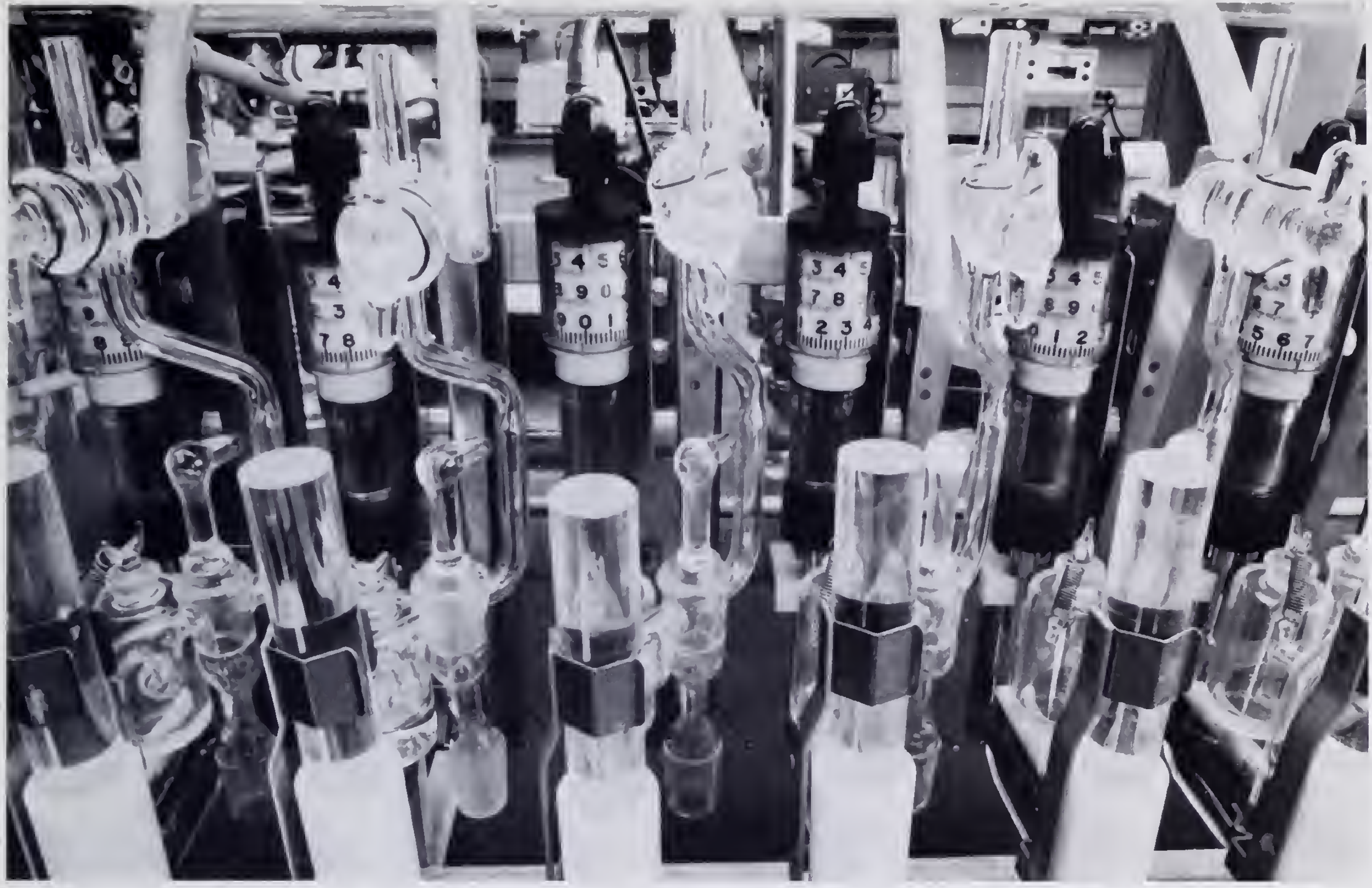
Anesthesiology offers weekly seminars and conferences, including a case discussion and lecture, all of which have been designated continuing education activities. Training in cardiopulmonary resuscitation must be made available to virtually all physicians, nurses, respiratory therapists, and many others within the Medical Center. Anesthesiology has undertaken to train all medical students in both basic and advanced cardiopulmonary resuscitation; and also offers to train any member of the Medical Center as an instructor in basic cardiopulmonary resuscitation.

Clinical training has been improved by the addition of a four-week training period in treatment of chronic pain.

Biochemistry

Biochemistry has continued to expand its research and teaching programs. A larger and more diversified faculty has been recruited and progress made in acquiring "state of the art" facilities and equipment to intensify the effort to maintain the highest standards of professional and graduate education and research. Recruitment has allowed expansion of activities in molecular biology, membrane biochemistry and the architecture of macromolecular assemblies, including membranes, cellular organelles and viruses. Eight newly recruited faculty members have received signal recognition of their talents through Irma T. Hirschl Career Scientist Awards, and faculty members received the prestigious Searle Award and the Alan T. Waterman Prize of the National Academy of Sciences.

Research accomplishments may be broadly grouped under four headings: Membrane Biochemistry, Recombinant DNA and Control of Gene Expression, Biophysics, and Protein Biochemistry and Metabolism.



In membrane biochemistry a concerted effort is under way to elucidate the structure, function and molecular biology of sodium-potassium dependent ATPase, a ubiquitous and vital element of all animal cells. Recent findings indicate that thyroid hormone regulates the synthesis of this element by augmenting the abundance of messenger RNA and suggest that the mechanism is defective in cancer cells. New chemical probes of membrane structure and function are under development, and a variety of physical methods, including circular dichroism, x-ray diffraction and neutron scattering, are being exploited in similar studies. An important part of these efforts is the ongoing analysis of acetylcholine receptors.

Development of neurotransmission in the postnatal mammalian brain is being mapped, and synaptic membrane antigens are being used to detect and characterize normal and abnormal brain development.

In the control of gene expression, pioneering work with viral DNA has paved the way for isolation of cellular genes by molecular genetic techniques and for stimulating new ideas and experiments in the correction of genetic deficiencies. Valuable findings are being made in the investigation of gene expression in normal and neoplastic cells and in the molecular mechanisms that mediate chemical and viral carcinogenesis. Gene transfer techniques are being used to study a variety of control mechanisms relevant to such diverse phenomena as genetic control of behavior, hormone control of metabolism and drug resistance in cancer therapy. Among other programs recently introduced is an analysis of the genetic recombination events that determine antibody specificity. Recombinant methods are now also being applied to definition of basic mechanisms in pituitary function and the role of small proteins in cell-cell communication.

In biophysics, an outstanding group of new faculty members are using a variety of sophisticated techniques in their research. These include x-ray crystallography and electron microscopy to study the structure and assembly of viruses and cell membranes and neurotoxins. Theoretical models are being developed to show how color vision results from electrical charges in proteins, and mathematical models are being designed for solving crystal structures. A new computer graphics facility is enabling analysis of molecular and supramolecular structures.

In protein biochemistry, investigation of the sickling process has revealed that the beneficial effect of some other hemoglobins, such as fetal hemoglobin, can be explained by the solubilizing effect they have on sickle hemoglobin.

The emphasis in metabolism is the investigation of direct physical and functional interactions between the protein and polysaccharide components of the metabolic system and the possible involvement of elements of the glycogen system in human disease. Regulation of the biotin operon, which is basic to understanding of vitamins and metabolic control mechanisms, is under investigation, as is the development of biological and synthetic systems for the production of hydrogen gas as a clean, safe fuel source.

Studies in steroid hormone biochemistry and metabolism are concerned with a newly discovered class of naturally occurring steroids, the so-called lipoidal derivatives; the biosynthesis of various hormones from their precursors; and metabolism of steroids by mammalian brain tissues.

Dental and Oral Surgery

In 1982 the School of Dental and Oral Surgery continued its tradition of expanding clinical and educational programs, while progressing with research in managing oral disease.

As a result of collaboration between the dental and medical schools and the hospital, for the first time in 30 years, dental patients here were treated by a full-time resident in Oral and Maxillofacial Surgery. The program has been well received, and the second resident in the three year program will begin in July of 1983.

A grant from the federal government allowed expansion of the general practice residency program in dentistry from two residents to three. For the first time this year, a student in periodontics also enrolled in the Master of Science program of the Institute for Human Nutrition.

Undergradute training of new dentists continued in the Dental Clinic, which was paid over 50,000 patient visits in 1982. Over 4,000 new patients registered for care in the clinics. Included in the School's class of 1982 were two students who simultaneously earned degrees in dentistry and public health administration.

To better serve patients, two additional treatment rooms have been added to the two already in operation, and the number of practitioners there has been expanded from three just a few years ago to 14 today. These additional facilities and extra staff allow us to provide patients with all but one necessary service, fixed prosthetics, and efforts are now underway to fill this gap.

In addition, the Special Services Clinic continued to be a resource to the handicapped. The clinic, where patients with craniofacial birth defects, neurological, cardiovascular, metabolic, psychiatric and orthopedic handicaps are treated, is solidly booked all of the time. When the clinic opened in 1951, it was the first university level treatment program of its kind in the world, and today remains one of only a few such programs in the entire region.

Last year the groundwork was laid for the Geriatric Dentistry Clinic, due to open in April this year. In the remaining eight months of 1983, an expected 800 patients will be seen for evaluation and treatment.

Plans for the proposed Clinical Dental Research Center have progressed significantly this year.

A wide range of research projects is already underway. To learn more about the bacteria that cause tooth decay, for instance, researchers are studying how the bacteria in the mouths of people being fed by stomach tube differ from the bacteria in the mouths of people who eat normally.

A system also is being developed to monitor the chemical changes and nerve transmissions occurring in the teeth in response to heat and cold, and to allow researchers to develop and test substances which could relieve hypersensitivity to hot and cold foods in some individuals.

Another system is being created which will visually display nerve cell firing on a screen, allowing dentists to monitor pain and take steps to minimize it.

The School also operates one of the few centers in the world studying the use of salivary analysis for the diagnosis and treatment of oral and systemic disease. Since saliva glands produce only minute amounts of saliva, scientists at the Center had to develop methods to experiment with ultra-small samples. These techniques are also used by CPMC ophthalmologists to study the ultra-small samples produced by the tear glands.

In conjunction with Otolaryngology, a program is being established to study oral and laryngeal cancer.

Funding for these research projects has increased dramatically in recent years. Last year the School raised $890,000 for research, up $426,500 over 1981 levels.

Increases in outside funding also have allowed the School to moderate its tuition increase. Grants to the School doubled during 1982, totalling $1,011,000. Alumni donated $120,000, up 50 percent over 1981. New York State also recognized the School's value to the community by awarding it $600,000 in special emergency funds.

Dermatology

During 1982, Dermatology continued to expand its patient care, research and teaching responsibilities.

The Department's twenty-two bed inpatient facility, upgraded under the Priority Projects program, is now equipped with the most modern photochemo and hydrotherapy units. It is currently staffed by specially trained dermatology nurses and is run in conjunction with an ambulatory psoriasis treatment center. Dermatologists are participating in Columbia-Presbyterian Medical Associates/East Side, the new medical offices on East 61st Street.

Construction currently is in progress for a new outpatient facility and a psoriasis day care center.

Dermatology continued its active role in teaching. As part of the major clinical year, each student had an intensive two-week course designed to offer theoretical and practical aspects of dermatologic care under the supervision of the attending staff.

Thirty medical students elected to spend a month in the Department during their fourth year. A program was designed to enable them to work with both clinical and research divisions of the Department. Residents from the Medical and Pediatric Services were able to receive additional training in Dermatology.

The Continuing Medical Education Program offered 46 hours of postgraduate training for the attending staff and practicing dermatologists. As part of this program, the Fourth Annual Carl Truman Nelson lecture, the Eighth Annual Arden House Conference and a basic science seminar on endocrinology were held.

Research continued on human DNA repair defects and their relationships to cancer and aging. Three new types of repair defects of DNA have been identified during the past year, including one which causes xeroderma pigmentosum. Other studies are revealing the role of DNA repair in preventing cancer caused by ultraviolet light. Recent studies of skin cells from people of different ages have shown that the body's ability to repair its DNA decreases with age.

New monoclonal antibodies have been developed, and are being used to improve diagnosis and to monitor therapy in leukemic patients. Studies of the mechanisms involved in skin T-cell interactions and epidermal induction of T-cell differentiation are continuing major research efforts of the Department. In addition, studies are in progress on water-soluble psoralen derivatives and new ultraviolet light sources, and their quantitative effects on lymphocyte function.

Research continued on adverse photobiologic effects of environmental agents. Particular stress was placed on a predictive animal model that was shown to be responsive to the recently described photosensitizers musk ambrette and methyl coumarin.

The Porphyrin Research Laboratory continued to provide a better understanding of the mechanisms of disorders of porphyrin metabolism. High resolution porphyrin biochemical methods were introduced which enabled the diagnosis of two patients with the very rare disorder hepatoerythropoietic porphyria. A poster exhibit describing these studies won the Gold Prize for teaching value at the national meeting of the American Academy of Dermatology.

The section of Dermatopathology currently is engaged in several clinical studies including: atypical xanthogranulomas of infancy; Bowernoid papulosis in infancy; Pseudomelanoma associated with the Goeckerman treatment of psoriasis; the etiology of angiofibromas, and the use of the skin biopsy as a prognostic test in assessing the treatment of Histiocytosis-X.

Studies also are in progress in selected aspects of the use of tar, phototherapy and other treatments for psoriasis.

Human Genetics and Development

The Department is involved in a wide range of studies in molecular biology. Researchers continued to investigate the molecular defects in the beta-thalassemias.

In the past year studies of the effects of suspected mutagenic and carcinogenic drugs continued using Chinese hamster ovary cells. Researchers also examined the effects of known carcinogens and mutagens on human cells, such as white blood cells, in the laboratory. This work helps confirm the view that some individuals may be genetically more susceptible to cancer and birth defects than others.

Investigators also are exploring RNA regulation and its role in cancer formation. They also have provided some of the first indications of how DNA crosslinks are repaired; developed a method to monitor the molecular intake of cells using a technique called fluorescence-activated cell sorting; continued studies of the three-dimensional structure of 16S ribosomal RNA and its properties; and developed a new electrophoresis technique. This latter development will greatly speed gene mapping and allow for the rapid analysis of the chromosome structure in small, simple organisms.

Attempts also are underway to identify the molecules on certain pancreatic cells which trigger the immune system, causing some types of diabetes.

Researchers are investigating the environmental factors which may prevent schizophrenia from developing among people who are genetically at risk.

Heroin and its effects on chromosomes also is being examined here. The chromosomes of patients with Alzheimer's Disease are under study, as are the effects of stress on chromosomes.

Studies of fetal death are continuing. The current phase of the study will concentrate on the relationship between caffeine and spontaneous abortion.

Patient care has been expanded as well. The Pediatric Genetics Clinic increased its patient load, and over 1,000 patients were seen in satellite clinics. The Clinic continues to provide comprehensive diagnostic and counseling services to patients and families with known or suspected birth defects or genetic disorders.

The clinic continues to test babies for eight metabolic diseases under the newborn screening program. Counseling is available to families of newborns with sickle cell disease as well as to patients in the Pediatric Hematology, Adult and Pediatric Muscular Dystrophy, and Ocular Genetics Clinics.

The Genetics Diagnostics Lab has expanded its space and personnel to accommodate the demand for its services.

The Genetics Division of Obstetrics and Gynecology also has continued to expand

its program in genetic causes of reproductive failure and antenatal diagnosis of genetic and chromosome disorders.

Though seemingly burdened with an extraordinary research and clinical load, the Department also has an active teaching program.

Medicine

The past year has been characterized by progressive growth in research, teaching and patient care programs.

Patient care has been consolidated into upgraded units which will be completed under the Priority Projects Program in 1983. Medical and cardiac intensive care units will be expanded and upgraded. Support services such as noninvasive cardiology and pulmonary function testing will be placed in close proximity to the ICUs to speed diagnosis and therapy.

Two specialized areas for ambulatory care are planned, and will be in operation some time in 1983. An Ambulatory Chemotherapy Center is nearing completion. The Center will allow cancer patients to receive chemotherapy as outpatients, thus reducing the need to hospitalize and separate them from families. The Medical Service also will participate in a State-approved regional kidney dialysis center, which will be able to accommodate 28 patients for outpatient chronic dialysis.

In addition to these specialized ambulatory care programs, the Medical Service continued its strong commitment to primary care. The Division of General Medicine has expanded its ambulatory care activities, and currently treats approximately 70 percent of general medical outpatients at the Medical Center.

The Division also has expanded its teaching activities, particularly in the undergraduate curriculum, and has embarked on several research programs. A recently completed study demonstrated the importance of continuity in patient/physician relationships in reducing needless utilization of inpatient and emergency services. Additional research on psychiatric illness in the elderly is being done in collaboration with the Center for Geriatrics and Gerontology.

A major focus of the Cardiology Division continued to be the diagnosis and therapy of irregular—and potentially lethal—heart rhythms known as complex arrhythmias. New developments in this area include expanded programs in the electrophysiologic diagnosis of arrhythmias and development of a computerized cardiac mapping system for use when surgery is required to control them. A vigorous program of development and testing of new drugs to suppress and treat arrhythmias is underway in collaboration with Phar-

macology. The Cardiology Division is participating in several national cooperative studies of anti-arrhythmic drugs. These drugs may be capable of preventing death from irregular heart rhythms following heart attacks. Development of sophisticated noninvasive techniques, such as imaging of the heart with radioisotopes, can provide important information on cardiac function. These now are in regular use in the care of patients with severe heart disease.

Other investigators are exploring the mechanisms which cause arteriosclerosis, the most common cause of heart attacks and strokes. Research in this area is supported by a grant to the multidisciplinary Specialized Center of Research in Arteriosclerosis, involving the Divisions of Metabolism and Nutrition, Gastroenterology, Cardiology and Hematology. Research is being conducted to determine how cholesterol is metabolized in the body, how it accumulates abnormally in arterial cells and how abnormalities in the blood vessels can cause the veins and arteries to become clogged by platelets, causing damage to vital organs. A fundamental understanding of the mechanisms behind arteriosclerosis is necessary before effective therapies can be developed.

In the Gastroenterology and Pulmonary Divisions the increasing use of fiberoptic instruments is enabling physicians to see disorders of the respiratory and gastrointestinal tract and to allow biopsies to be taken under direct vision, enabling early diagnosis. Endoscopy suites for pulmonary and gastrointestinal endoscopy are being modernized and enlarged so that these services can be provided to additional ambulatory patients. Using these advanced instruments, physicians are working on new means to control gastrointestinal bleeding without surgery. A recently completed study in the Gastrointestinal Division showed that early detection of gastric cancer using fiberoptic endoscopy permitted early operations and substantially better prognoses than would be likely if the cancers were more advanced.

In the Hematology Division, research into blood coagulation has made it possible to detect venous thrombosis at an early stage, and to institute effective therapy. Other researchers are applying advanced molecular biological techniques to study the genes of patients with hereditary anemias, in an attempt to devise effective methods of therapy and prevention.

The Division of Hormonal and Metabolic Disorders is investigating diseases of the bone, including hyperparathyroidism and Paget's Disease, as well as therapy for high blood calcium levels that result when bone is destroyed by tumors.

The Division of Rheumatology is studying how white blood cells influence the immune response. In particular, T lymphocytes are being studied to isolate specific subclasses of these cells which can either facilitate or supress the immune response. This research is already helping to clarify various immunodeficiency diseases, as well as rheumatologic disorders such as rheumatoid arthritis and systemic lupus erythematosis. These two diseases are caused by malfunctions in the immune system and lead to self-destructive tissue injury.

The Division of Immunology continues to develop antibodies for diagnosis and therapy. Collaborative studies have established clearly the effectiveness of specific antibodies in treating life-threatening intoxication from digitalis. An expanded clinical teaching program, consultation rounds and conferences have been established for allergies.

The Infectious Disease Division is studying how bacteria become resistant to commonly used antibiotics. The Division also continues to be at the forefront of clinical testing of new antibiotics in the treatment of infections caused by resistant bacteria, a constant and serious problem.

The Division of Endocrinology is evaluating new drugs to treat pituitary tumors without surgery

In order to expand its research activities, one floor of the P&S building is being renovated to house laboratories for the Gastrointestinal and Renal Divisions. Generous support has been provided, in part, by the Dana Foundation.

Microbiology

The Department has had a successful year in its educational, research and recruitment programs. In addition to the basic general microbiology course for medical, dental and graduate students, the faculty presented advanced graduate courses in virology, immunology, bacterial genetics and bacterial physiology. Faculty also participated in an interdepartmental graduate course in Molecular and Cell Biology. The research projects of all faculty members are fully supported by national agencies such as the National Institutes of Health, National Science Foundation, American Cancer Society and the Multiple Sclerosis Foundation. Research activities also have been recognized in that there have been wide demands for faculty to give research seminars and named lectures throughout this country, as well as abroad.

The Department has been extremely fortunate in adding to its faculty three young scientists from the Max Planck Institute in Munich, the Massachusetts Institute of Technology and Harvard University.

Five candidates for the Ph.D. in Microbiology joined the graduate program, bringing the total of graduate students to 24. Ten postdoctoral fellows are also receiving advanced research training in various aspects of microbiology.

Among major fields of research interest for the faculty are the structure, mode of replication and mechanism of cellular damage and transformation of adenoviruses; the immunochemistry of nucleic acids; photoresponsive systems; monoclonal antibodies and the structure of their combining sites; histocompatability antigens; *Chlamydia trachomatis* antigens, and infectious and/or immunologic causes of spontaneous abortions; the regulation of Ig synthesis; molecular interactions in viral infections of mammalian cells, using herpes simplex virus as a model; functional antigens of *trichenella spiralis;* induction, development and regulation of immunologic disorders; cell membrane transport systems; poliovirus clones; transcription in bacteriophage T4-infected cells; trypanosomal exoantigens; RNA tumor virus replication; and various aspects of immunoregulation.

Neurological Surgery

Though Neurosurgery remained a leader in its field, over the past year patient volume became static because the availability of beds and operating rooms was limited. This situation should be remedied as soon as facilities upgraded under the Priority Projects program become available. These include intensive care, recovery and operating rooms, as well as rooms and wards for neurosurgical patients.

As the physical facilities are upgraded, we will be able to develop a comprehensive stroke program in which Neurology, Neurosurgery and Neuroradiology will participate. This program will permit doctors to apply surgical techniques to treat a wide range of patients afflicted with one of man's most common disorders, cerebral vascular disease. Treating these patients in a comprehensive and methodical fashion may allow reversal and cure of these disorders, which now are often fatal.

The Service's expertise in the treatment of vascular diseases of the brain and spinal cord is world renowned, and has attracted referral patients from around the globe. These referrals include patients suffering from aneurysms and arteriovenous malformations (abnormal clusters of blood vessels that bleed easily). Strokes caused by clogged, hemorrhaging or malformed blood vessels in or leading to the brain are now being treated with bypass procedures and carotid endarterectomy. The results of this innovative surgery, much of it utilizing the operating microscope and microsurgical techniques, have been gratifying. Many of these once fatal conditions now can be cured, and a high percentage of patients can even return to work.

Neurosurgical residents and staff are participating in brain tumor research programs and are evaluating endocrinological problems related to the brain, particularly those created by tumors in the pineal and pituitary region. Many procedures to remove microscopic tumors of the pituitary gland were successfully performed with microsurgical techniques. Pineal tumors, which until now have been inaccessible, can now be operated on and, in many instances, removed.

Rare disorders of the spine, such as malformations or tumors within the spinal cord, both producing progressive paralysis of the body, have been successfully managed through microsurgery.

Laser surgery has been studied but requires further evaluation before it can be used on a large scale. Novel ultrasonic equipment has been obtained which can liquefy solid tumors; it has been of immeasurable assistance in the removal of benign tumors in difficult and relatively inaccessible areas of the brain.

Postgraduate education in neurosurgery was promoted with numerous in-house conferences and visiting lectures, as well as participation in an annual surgical update, conducted by all the university neurosurgical departments in New York City.

Excellent candidates have applied and a few accepted for the neurosurgical training program. Neurosurgery has extended its period of residency training and made its requirements for entry even more stringent.

Neurology

Recent activities have been concerned with a broad spectrum of interests from the neurological status of infants in Neonatal Intensive Care to neurologic diseases in old age.

Parkinsonism and other abnormalities of the aging brain are being studied by members of the Movement Disorders Group. Levodopa therapy is beneficial for patients, but it causes undesirable side effects. Our investigators have found that degradation products of the drug may interfere with its therapeutic effects and they have studied specific chronic effects of levodopa on brain cells. They have also investigated new drugs that may be beneficial with fewer adverse affects. Better understanding of these effects should lead to better treatment.

Related studies concern the mental and emotional consequences of Parkinson's diseases, and the possible relationship of chemical or hormonal alterations to the often-disabling depression or dementia.

Neuropeptides may play a role in abnormalities of the aging brain. Investigators are using monoclonal antibodies to study the location of several peptides in normal brain. In transplantation experiments they found that normal brain tissue could supply hormones that are lacking in the brains of some strains of mice. Peptides may also play an important role in the development of migraine headache because oxytocin and vasoactive intestinal peptide were found to have potent effects on blood vessels in the normal brain.

At the other end of life, investigators in the Division of Pediatric Neurology started a new program to evaluate the neurologic status of infants treated in the neonatal ICU. A tissue culture facility has been established to study inherited neurologic diseases of childhood, disorders of oxidative metabolism of the brain (such as Reye's syndrome) and brain tumors.

Immunologic research includes analysis of drug-induced myasthenia gravis, identification of the nerve protein that reacts with monoclonal antibodies in some patients with plasma cell dyscrasia, and attempts to develop immunotherapy for brain tumors.

Genetic research has led to the discovery of one disease caused by lack of a mitochondrial enzyme (cytochrome c oxidase) and another characterized by chronic lactic acidosis with cerebrovascular disease in children. The missing enzyme in Tay-Sachs disease has been found to be likewise absent in some individuals with quite different disorders, such as spinocerebellar degenerations or motor neuron diseases. These studies may provide a clue to the nature of diseases that have defied analysis until now.

In research related to muscular dystrophies, investigators have studied calcium regulation in muscle; control of adenylate cyclase; the physical and enzymatic properties of surface membranes; evaluation of a simple biochemical test to identify people who are at risk for a rare condition called malignant hyperthermia; control and action of the acetylcholine receptor; and therapeutic trials for amyotrophic lateral sclerosis (ALS).

Persistent infection with poliomyelitis virus has been demonstrated in mice and in cultured cells, findings that may be important in the pathogenesis of ALS.

Viral studies have led to the identification of acute and chronic forms of encephalitis in victims of the new condition called acquired immunodeficiency disease.

Nursing Service

The Service continued its efforts to improve patient care in 1982. A new position, nursing care clinican, was created to lead the patient care unit on a 24 hour basis, develop the unit staff and apply the latest in nursing research to patient care. The new position has done much to strengthen the unity of the Service and to reduce variations in performance among patient care units.

The staff has been enthusiastic about the design and efficiency of the patient care units upgraded under the Priority Projects program. Ward type accommodations are quickly becoming a thing of the past. New supply delivery systems have been implemented as units have been upgraded, and will be fully in place in the Spring of 1983.

The recruitment program took on a new look this year, with two recruiters joining the staff in June. They have capitalized on their knowledge of the field and concentrated their efforts in areas where the potential for recruitment is high. While recruitment from the traditional areas of Greater New York, New England and the Middle Atlantic states provides the greatest number of recruits, increased emphasis has been placed on national and international recruitment. In May, 16 nurses from the Philippines arrived, and they have quickly become a part of the Medical Center community. A number of Canadian nurses also have been recruited. In 1982 a total of 447 nurses were recruited, up from 372 in 1981.

A major effort has been underway to retain nurses already on staff by providing them with opportunities for promotion and reducing the number of problems which have led to resignations in the past. Considerable headway was made in reducing overtime, rotation to other shifts, and the number of weekends worked, which clearly demonstrated the Service's intention to respond to those issues which have contributed to turnover in the past.

The Division of Education met the challenges of increased recruitment through a year-round orientation schedule. In addition, expansion of many of the intensive care units thoroughly tested the core critical care nursing course. It has proven effective in preparing nurses to practice in critical care areas throughout the various services. The Edna McConnell Clark School of Nursing continued to be very successful in preparing practical nurses for advancement to professional nurse status.

While efforts to keep the nursing staff at full strength were highly successful in 1982, the Service still needs a planned effort to provide quality nursing care in the future. At the first Conference on Patient Care, representatives from all levels of the CPMC community joined together to develop new models of patient care delivery. The report of the conference will be used as a basis for future planning.

School of Nursing

Recognizing that full time study is possible for fewer and fewer students, the School has instituted a variety of options so that students can work part-time or full-time or return to the work force as soon as possible.

Part-time study now is available to all students. Ten percent of the entering undergraduates and 36 percent of entering graduate students study part-time, a result of both recruitment and changes in course scheduling, such as more evening classes and summer courses.

In a limited but promising new part-time study concept being developed by the School and a clinical affiliate, certain graduate students can complete the acute care (adult) major in three years and still work full time. They will alternate part-time classroom study in the fall and spring semesters with intensive clinical instruction and evaluation in the December-January intersession. Course preceptors have dual appointments.

Baccalaureate students have their own "learn-earn" opportunity in hospital externships. During the summer after their first year, the students combine full-time hospital practice with weekly seminars led by the staff education departments.

Undergraduates also can choose accelerated study, which moves up graduation almost six months. Courses will be taken throughout the calendar year.

In keeping with its commitment to expand graduate study, the School has implemented one new clinical major and begun planning for a second. The new major, community nurse specialist, will prepare nurses to assess and analyze the health needs of populations, develop and implement community programs and services, and deliver services to urban, suburban and rural populations. The proposed major is one that combines elements of the adult nurse practitioner and psychiatric-mental health majors. Such practitioners will fill the need for primary care

managers who can deliver both physical and psychiatric health care.

The School also has begun to address the significant problem of registered nurses who, for a variety of reasons, maintain their certification, yet choose not to practice. The RN Re-entry program, for RNs who have not practiced for three or more years, is a collaborative program. A series of progressive workshops are used to encourage inactive nurses to return to hospital practice, bring them up-to-date with the latest technology, and instill competence and confidence in new nursing skills and interventions.

Obstetrics & Gynecology

1982 was another year of intensive activity and achievement, the most significant of which occurred at year end: two patients were accepted into the new In Vitro Fertilization Program which will complement existing infertility treatment services. This is a comprehensive program that only can be offered at a major medical center, and it is believed that within the foreseeable future it will serve a large section of the eastern United States.

The opening of the inpatient obstetrics services on three floors of the Center for Women and Children and the completion of the new labor/delivery suite marked the conclusion of a major part of the Priority Projects program. The new labor/delivery area includes a suite of rooms which will operate as a self-contained, family-centered delivery unit and will provide not only a home-like atmosphere but sophisticated intensive care services.

Improving and maintaining the quality of education for both students and residents always has been a major priority. The Gynecological Teaching Associates, volunteer women who serve as subjects as well as instructors for the teaching of obstetrical and gynecological examinations, were incorporated into the teaching staff, and were enthusiastically received by the students. The Teaching Associates' activities are expected to expand into other areas.

Extensive clinical and basic science research studies continue, ranging from problems in the biochemistry and physiology of reproduction to genetics, neoplastic diseases and perinatal medicine.

Ob/Gyn, with a broad base of maternal-fetal medicine expertise, continued to increase the volume of patient care activity in the past year. The new labor and delivery suite includes space for maternal-fetal intensive care, and maternal transports to the Regional Center for Tertiary Perinatal Care continued to increase at a rate of approximately 30 percent per year, with over 110 transports in 1982. Maternal-fetal medicine consultation and outreach education services are expanding into the Perinatal Network hospitals in New Jersey, New York and Connecticut. Design of a centralized perinatal center facility, adjacent to the intensive care nursery in the new labor and delivery suite, is in progress, and will complete the consolidation of perinatal services in the Center for Women and Children.

The quality of care in 1982 was greatly improved by changes instituted in 1981 in the Vanderbilt Clinic, including a scheduling system for residents to assure continuity of care of patients and elimination of the block system of appointments.

Ophthalmology

Ophthalmology continues to maintain a position of pre-eminence in the diagnosis and medical and surgical care of patients with eye disorders. Teaching activities focus on clinical aspects, while research includes virtually every aspect of clinical and basic ophthalmology.

A large group of scientists concentrate on the formation of cataracts and the factors which cause lens opacities. Particular emphasis is being placed on the chemistry of the lens fiber cell membrane, since it is believed that the early stages of cataract development occur in this membrane. Some cells in the lens appear to be damaged by ionizing radiation. The similarity between cataracts caused by radiation and other types of cataracts may offer scientists a new way to understand this abnormality.

A different group is concerned with the mechanisms that keep the cornea transparent. Experiments in this area center on the problem of fluid transport across epithelia. Other investigations are directed towards the study of synthetic antibiotics for bacterial ulcers.

Clinical research continues on the use of various types of extended wear contact lenses. Numerous other investigations here are focusing on vascular diseases of the retina, particularly diabetic retinopathy, and their treatment.

Some of the developments pioneered by Ophthalmology already are undergoing clinical trials. Various laser devices are being explored for potential clinical applications, for instance. And a laboratory-clinical investigation is studying tear film and human tear analysis, with the hope that new insights will be shed on the dry eye problem. Other clinical studies are concerned with the use of a viscous substance, originally developed as a vitreous substitute, in glaucoma and cataract surgery. Various studies are in progress to evaluate anterior and posterior chamber intraocular lenses, their relative merits and complications.

The problems of strabismus are being explored from a functional point of view, medically, electrophysiologically and with various surgical techniques. CPMC long has been a referral center for ophthalmic oncology, and numerous studies continue on ocular and orbital tumors and their management.

The study of human and primate retinas is a subject of great concern, particularly in three areas: tissue culture of human retinal cells obtained from donor eyes, the biochemistry of these retinal cells, and the physiology of intact primate and human retinas.

Neuro-opthalmological syndromes involving the optic nerve continue to be important to Ophthalmology and Neurology. Of particular interest are clinical investigations into the accuracy and sensitivity of CT scanning and its use in analyzing disorders of the visual system.

Several prostaglandin derivations have been found that are many times more effective in reducing pressure within the eye than the parent prostaglandins; this has obvious potential importance in the treatment of glaucoma. Investigations into the roles of trace metals in normal ocular physiology and various disease states have been initiated. Clinical studies have demonstrated that ocular flurophotometry is an extremely sensitive way to detect subtle abnormalities in ocular vascular permeability. A greatly improved corneal specular microscope has been developed and its value in clinical use demonstrated.

The role of arachidonic acid metabolites in controlling corneal inflammation is being explored together with the mechanisms of action of various anti-inflammatory agents. The effects of steroids on corneal epithelial cells is particularly important.

Electroretinography has been used clinically; at the cellular level, a study of the

electrophysiology of human cones is in progress. A clinic was established for ocular genetics and ocular electrophysiology.

Upgrading of the patient care facilities was completed under the Priority Projects program in 1982.

Orthopedic Surgery

There has been a significant "explosion" in orthopedic surgery as a specialty, based mostly on dramatic improvements in joint replacement. It is now possible to replace every major extremity joint, including fingers and toes.

Replacements currently constitute Orthopedics' largest proportion of cases, with hip replacement the leading single procedure. The Department has an outstanding program of research and development of replacement joints of the hip and knee.

The Trauma Service is playing an increasingly important role in the community, as in the past five years most other nearby hospitals have closed.

Orthopedic Surgery has established a major resource in joint arthroscopy, especially of the knee, and surgery through the arthroscope has dramatically reduced the recovery period for knee surgery; instead of a ten-day recovery with a swollen knee, patients are now on their feet in 48 hours, with greatly reduced post-operative problems.

The Pediatric Orthopedic Service has expanded its scoliosis/spinal service with the addition of new staff. New techniques in spine fusion for paralytic patients have been introduced. Congenital pseudarthrosis of the tibia, which normally has a 50 percent amputation rate in children under 12, has been successfully treated by microsurgical transplantation of the fibula in the largest series yet reported. In conjunction with Pediatric Oncology, children with malignant bone tumors are receiving cadaver replacements and chemotherapy, which in a number of cases has saved limbs.

Research and training in the Microsurgery Laboratory have been made possible by contributions from the House of St. Giles the Cripple Foundation.

In the research laboratories, the use of pulsating electromagnetic fields is being expanded to areas other than nonunion fractures and aseptic necrosis of bone. The Biomechanics Laboratory continues to develop new implants, and, in conjunction with NASA and a group of Swiss researchers, has developed remote radio telemetry to assess stresses and strains on bones as they heal. It is now possible to measure forces never measured before, without wiring. This method is of tremendous help in evaluating both implants and healing.

The Department has initiated a preceptoral system in the third year of medical school. This exposure combined with the exciting opportunities provided by our joint replacement program and other innovative techniques has resulted in a record number of applications for postgraduate training here. Two postgraduate courses were given in 1982 for practicing orthopedic surgeons: a general review course and a course on external fixation in trauma.

Otolaryngology

Otolaryngology has experienced continued growth and development during 1982. Clinical activities are evolving toward the treatment of more complex and difficult problems, especially in the area of head and neck surgery and neuro-otology. The division of Head and Neck Surgery treated 130 new head and neck malignancies in 1982 from the Otolaryngology Clinic alone. This represents an increase of more than 200 percent since 1977. This is in part due to the active collaboration with Radiation Therapy, Medical Oncology, and Oral and Maxillofacial Surgery.

We are establishing a new program for the diagnosis and treatment of premalignant oral and laryngeal lesions with Oral Pathology and Oral Surgery. Our cooperative efforts with neurosurgery include treatment of acoustic neuromas, excision of pituitary tumors and cranial-facial surgery. A division of Pediatric Otolaryngology was established this year with particular emphasis on pediatric otology and management of problems of the upper airway. We are part of a multi-center study for the use of interferon in laryngeal papillomas.

Our priority in education is the one-week otolaryngology course given to third year medical students. Efforts of the entire department are directed towards this most enjoyable and rewarding activity. Our residency training is attracting outstanding students from our own undergraduate programs and from other medical schools throughout the country. The Department's New York Basic Science Course is firmly established with enrollment of all the New York metropolitan residency training programs. Continuing Education Programs for 1982 consisted of two conferences on Complications in Surgery: a Head and Neck Conference and an Otology Conference. Participants came from as far away as Germany and Hawaii.

Recent experiments carried out in the E.P. Fowler Auditory Physiology Laboratory indicate that the frequency tuning of auditory nerve fibers originates in mechanical responses of the hair cells (stereocilia) and not from mechanical properties of the basilar membrane as was previously thought.

Studies in our connective tissue laboratory have shown that indomethecin inhibited tumor growth and improved survival in induced head and neck tumors in rats. Studies in chronic otitis media have demonstrated that mechanical factors mediated by connective tissue enhance bone resorption. Bone resorbing factors were modulated *in vivo*, causing changes in otic capsule bone.

Pathology

The Department has been focusing on several areas of basic biology as well as clinical pathological investigations of various diseases and syndromes. Research activity has been concentrated in four major areas.

A large group of immunologists are studying the development of cells involved in the rejection of kidney and heart transplants and have been working to develop monoclonal antibodies for several diseases, including neoplasia. Characterization of white blood cell markers in various leukemias and lymphomas and identification of tumor antigens in breast cancer are studies also being pursued.

A second large area of research involves the aging process. Statistics on the incidence and prevalence of diseases and lesions in aging are being compiled. In addition, the changes that occur with age in particular organs, including the skin, ovaries and white blood cells, are being investigated.

A third area of investigation involves basic and clinical genetics. It extends from studies of chromosome structure and chromosome expression to recombinant DNA studies in human cells. Also included is the isolation of human interferon.

And in the fourth area investigators are studying clinical pathological findings in a variety of diseases involving several organ systems, including cardiovascular, pulmonary, hepatobiliary, renal, reproductive, neurobiological, endocrine, bone and genitourinary systems.

A large group of staff members is concerned with supplying modern laboratory services. The identification of new organisms, particularly viruses, is an important objective of Pathology's program to develop new laboratory procedures. Automation and computerization are major areas of focus in the chemistry laboratory program.

The recruitment of a new Blood Bank director is enabling the Hospital to introduce new methods of breaking down whole blood into its various components and of typing patients for treatment of cancer.

The anatomical pathology laboratories have been upgraded under the Priority Projects program, and a computerized records system has been installed.

The Department continued to conduct formal courses for first, second and third year medical students and participated in a large number of interdisciplinary conferences with all of the clinical departments. The residency program provided thorough training in diagnostic skills needed by practitioners of anatomical and clinical pathology, as well as specific training in particular research areas. The Department gave five formal postgraduate courses for physicians and clinical specialists, participated in programs off-campus, and is starting a new program for MD/Ph.D. candidates in physiology and pathology.

Pediatrics

The close cooperation between Pediatrics and Obstetrics in a fully integrated Center for Women and Children (CWC) is now a reality. As a result, the Medical Center has under a single roof almost every medical service that can be offered for women and children. The CWC is the first and only facility of its kind in New York, and it has enhanced clinical, teaching and research activities for both Pediatrics and Ob/Gyn.

The pediatric occupancy rate has been at or near capacity.

Visits to the Pediatric Acute Care Unit increased to more than 47,000 last year. In the General Pediatric Group Practice, three pediatric nurse practitioners and five full-time equivalent pediatricians have joined the staff. Patient visits rose to nearly 22,000 in 1982, with about 250 patients admitted. The Developmental Clinic, in response to increased demand, has increased the number of practitioners from two to five, and has added a psychologist.

The Therapeutic Nursery for families with parenting problems, including neglect and abuse, now includes a staff of four full-time professionals and four half-time Foster Grandparents. There were approximately 3,000 visits to the Nursery in 1982. Support from the Babies Hospital Board of Women Managers continued to enrich the program. The Nursery is considered a model in the City, and agencies throughout the metropolitan area have visited it or requested information about it.

The Women, Infants and Children (WIC) program continued to serve about 1,500 mothers and children with nutrition education and food supplements. The neonatal unit operated at or near capacity. Twenty-seven percent of neonatal patients were infants transferred to the Unit through the Regional Perinatal Network. This nevertheless reflected a relative increase in the number of high risk pregnancies transferred through the Network to Ob/Gyn. Transporting a high-risk pregnant woman prior to delivery, if possible, is much safer for the child. Survival of very low birthweight infants without physical, neurological or mental impairment has become the norm rather than the exception.

The Allergy Clinic had nearly 4,000 visits, and the pediatric allergists' private offices had an additional 7,000.

The Pulmonary Division provided specialized consultations for infants and children with a variety of respiratory disorders, and continued to operate the Cystic Fibrosis Center. It now performs routine pulmonary function tests and specialized studies of cardiorespiratory function under exercise conditions in one of the most comprehensive exercise laboratories for children in the country.

The Division of Pediatric Cardiology managed a large number of patients with congenital heart disease, many of whom required cardiac surgery. New facilities for

echocardiography and 24 hour electrocardiographic monitoring now are in operation. An Arrhythmia Treatment Center has been established.

The Division of Hematology/Oncology continued to care for a large number of patients with leukemia, solid tumors, sickle cell disease, thalassemia and lead poisoning in its newly furnished "day hospital" facility.

In addition to its busy inpatient consultation service, the Gastroenterology Section handled more than 500 patient visits last year. Work conducted within the Division of Metabolism and Nutrition allowed many children who in the past would have required prolonged hospitalization to be discharged on continuous nasojejunal feeding or home intravenous nutrition. The Pediatric Nutrition Support Service has assumed responsibility for distributing formulas to inpatients, and provides consultations about nutritional problems and manages all patients receiving total parenteral nutrition.

The Section of Nephrology has provided a major referral service for children with renal disease, hypertension, fluid and electrolyte disorders, as well as for dialysis and renal transplantation patients.

Patients referred to the Division of Adolescent Medicine were able to take advantage of two clinic sessions per week for psychosocial and medical evaluations by a team of physicians, nurses, family therapists and social workers.

The Section of Rheumatology provided consultations for patients referred from around the world.

The Division of Education expanded tutorial sessions for house officers, and increased its commitment to student teaching by increasing the number of sessions with the students. Many divisions participated in seminars and continuing education programs at the Medical Center, in the community, and at other institutions.

Research in the Division of Genetics has focused on the effects of suspected chemical mutagens and carcinogens on Chinese hamster ovary cells, and on genetic responses of neurofibromatosis cells. Studies are in progress to determine the effect of the carcinogen diepoxybutane on blood cells taken from cancer-prone patients.

The Pulmonary Division has pursued several studies of the metabolic functions of the lung. These studies have demonstrated the importance of oxygen as a modulator of vasoactive mediators and hence of blood pressure and vascular resistance. Investigators also have studied the role of prostanoids in the circulatory control of primary pulmonary hypertension of childhood and the effect of maturation and sleep on cardiorespiratory control in early life.

Recent studies in the Division have demonstrated the importance of endorphins in controlling respiratory patterns. Investigators in the Division also have developed an animal model for the study of fatigue of respiratory muscles. In collaboration with the Division of Hematology/Oncology, the Pulmonary Division has been examining the effect on oxygen transport of chronic anemia and chronic transfusion therapy for thalassemia. The Division also identified a muscular dysfunction as a cause of the disturbed lung mechanics in patients with scoliosis.

As part of a collaborative study group, the Section of Rheumatology participated in the evaluation of penicillamine and hydroxychloroquine therapy in arthritic children. This federally funded study is being carried out in parallel with a study in the Soviet Union, providing an opportunity for exchange of information between pediatric rheumatologists from both countries. The Section has extended its studies of spondyloarthritis in children, and information gleaned from them is helping to distinguish between rheumatoid arthritis in adults and arthritis related to ankylosing spondylitis

The Division of Endocrinology continued its study of the effects of chronic administration of tetrahydrocannabinol (THC) in mouse embryos and found a significant increase in abnormal ova in sexually immature mice given THC for three weeks. A new clinical trial of synthetic human growth hormone, produced by recombinant DNA techniques, is underway in children with growth hormone deficiencies.

In the Division of Metabolism and Nutrition, research has continued on enteral and parenteral nutrition of low birthweight infants and of older infants who have a congenital anomaly of the gastrointestinal tract or who have chronic diarrhea and cannot eat normally.

The Section of Gastroenterology addressed the management of children with biliary atresia after surgery. A study on the effects of phenobarbital on bile composition and drug disposition in these children has been initiated. Research on the effects of protein fractions of breast milk on mucosal growth is continuing. Research comparing the responses of premature infants fed human milk or a number of formulas differing in protein and calorie content is underway. To assure that an adequate supply of human milk is available for these studies, the first research human milk bank has been organized.

The Section of Nephrology completed, under the auspices of the NIH, a three-year study of acid balance in chronic renal failure.

Researchers in the Newborn Lung Center of the Division of Perinatology are studying the causes of respiratory distress syndrome of infancy. A clinical trial of antibiotic therapy to eradicate Group B streptococcal infections in newborns was started. A significant delay in the development of infants treated with methadone has been demonstrated.

Research in the Division of Hematology/Oncology included an analysis of erythrocyte protoporphyrin elevation in childhood lead poisoning. The use of a promising new oral drug for lead poisoning has been subjected to a clinical trial among lead industry workers. Preliminary results indicate that the compound is extremely effective, well tolerated, and without significant side effects. Scientists here have also devised a way to separate young red cells from units of banked blood. These red cells survive longer than red cells in ordinary banked blood, making fewer transfusions necessary and retarding abnormal lead accumulation in patients who are dependent on blood transfusions for survival.

A Sickle Cell Disease Comprehensive Center has been funded by the NIH. This large scale project involves the cooperation of pediatricians from CPMC, as well as from hospitals in Harlem and on the West Side of Manhattan. The Center will provide patient care, genetic screening and education, in addition to basic research. In cooperation with Orthopedic Surgery, the Division is studying chemotherapy designed to salvage limbs of patients with bone cancer. The Division also is studying the mechanism behind red blood cell aging, and, in cooperation with Neurology, is evaluating genetic defects of the phosphofructokinase enzyme system that result either in blood or nervous system disorders or both.

Research in the Division of General Pediatrics includes a study of the use of pediatric encounter forms nationwide and an

analysis of an earlier pilot study of home based health records. Investigators supported by SNUGLI, Inc. and Ross Laboratories have begun a study of the psychological effects of the use of soft baby carriers on infants. A study of the neuropsychiatric consequences of irradiation of the central nervous system in acute lymphocytic leukemia includes examination of the ways children and families cope with the stresses related to this disease.

The Division of Infectious Diseases has continued its studies of "scavenger" white blood cells known as phagocytes and has initiated new studies of phenytoin in white blood cells. Several new disorders of leukocyte function have been reported.

The Division of Pediatric Neurology continued its investigations of brain tumors in animals and of childhood movement disorders, especially dystonias. In conjunction with the Pulmonary Division and the Neurology Service, pediatricians under support from the NIH are investigating the causes and effects of Reye Syndrome.

The Division of Adolescent Medicine continued to study how puberty affects individual responses to drugs. Investigations of intermediary nitrogen metabolism continued, supported by a grant from the VERTEX Corporation. A series of new projects aimed at managing the medical and surgical problems associated with diabetes were begun, in conjunction with Surgery and Pathology. Included in these studies is an investigation of the value of a closed loop insulin pump, in effect, an artificial pancreas.

Pharmacology

Pharmacology continued to expand its programs of research and training, and its efforts to obtain outside funds to support these activities.

In collaboration with the Center for Neurobiology, members of the Department studied the effects of serotonin, a substance made by the body to transmit nerve impulses, on the membrane of a sensory nerve cell. Serotonin, they found, modifies the membrane and the behavior of the nerve cells. The findings may help explain how short-term memory works.

In collaboration with Pediatrics and investigators from other institutions, Pharmacology organized a major new program of studies to investigate why sensitivity to drugs changes with age. This program will attempt to identify the factors that modify the response of the neonate, the infant and the child to cardiac drugs, and will look at the importance of the autonomic nervous system in altering drug response.

In cooperation with local law enforcement agencies, one member of the Department completed a novel study on the effects of illicit drug use on criminal behavior. This study will test, for the first time, many assumptions now made about drug abuse and antisocial activity.

In collaboration with Pediatrics, a new method was developed to separate young red blood cells from pooled blood, so that patients requiring repeated transfusions might be protected from the adverse effects of excess iron which accumulates with chronic transfusions. Also, clinical trials began on a new oral agent for the treatment of lead poisoning. Finally, means were perfected to isolate intact living cardiac cells in the lab. This technique will facilitate a number of important studies of cardiac electrophysiology and antiarrhythmic drugs.

Physiology

During the preceding year, the Department's efforts and attention were focused on biological membranes. This emphasis will continue in the coming years as the structure of biological membranes, their biophysical properties, and their functions in diseased states are explored. Classical studies of organ physiology, including the physiology of cardiac, respiratory, renal and digestive tissue, are now more often the realm of the clinical departments.

The study of cell membranes depends considerably on the development of new biophysical techniques and equipment. For instance, in the Division of Circulatory Physiology and Biophysics, researchers are emphasizing microcirculation and the mechanisms that regulate exchange between blood and tissues.

Research is pursued at the level of the molecule, membrane and organ, then correlated with theoretical models and clinical observations. Basic knowledge concerning the composition and dynamics of red and white blood cells has led to a better understanding of blood flow in both large vessels and microcirculation. This in turn has led to opportunities to investigate such things as the formation of sickle cells and abnormal lipid composition in red blood cell membranes. The study of red cell dynamics and interaction not only has shed light on such disorders as myocardial infarction, but has suggested possible therapies. For example, the study of the transport of large molecules into the arterial wall because of high blood pressure explains, in part, the observation that hypertension increases the risk of atherosclerosis.

A different approach is used by researchers in the Division of Membrane Physiology, where the focus is on the molecular basis of membrane function. Emphasis here is on identification of membrane proteins that affect biological transport and the protein-lipid interactions that affect membrane function. These studies have increased understanding of the interaction between vitamin D and calcium, providing insight into how vitamin D works at the cellular level. Significant details of the transport of d-glucose across cell membranes also have been discovered.

New fluorescence methods are being used to study membrane lipid fluidity, a major influence on transport across cell membranes, as well as shape and stability. These methods open new possibilities for diagnosis. Members of the Department continue their pioneering efforts in the study of neuromuscular transmission in skeletal muscle, the mechanism of desensitization in the postjunctional membrane, and research in transport across membranes using model physicochemical systems.

Psychiatry

The past year has been one of great productivity and innovation. The inpatient psychiatry service continued to serve as a model for successful treatment of hospitalized psychiatric patients and as a training ground for mental health professionals. Newly established were a Psychogeriatric Unit designed to address psychosocial problems of the elderly, as well as a Hispanic Clinic. The Center for Geriatrics and Gerontology developed an innovative model for the long term care of the elderly, including outreach services for those patients who are physically unable to come in for care.

Ambulatory psychiatric services continued to serve an increased number of pa-

tients and currently evaluates more than 550 per year, while carrying over 650 patients in ongoing treatment. Advances in computer technology have enhanced the clinic's ability to screen and evaluate patients.

The Psychoanalytic Center for Training and Research made significant clinical, educational, and research contributions last year. Research efforts focused on techniques to evaluate patients who received psychoanalysis.

Numerous investigations continued in the field of somatic psychiatry. Extensive studies here have explored electroconvulsive therapy in the treatment of affective illnesses, as well as the relationship of brain lateralization to depression and other mood disorders. Studies of psychotropic drugs in the treatment of affective disorders, anxiety and panic disorders continued.

The Department continues its efforts to understand the molecular basis of behavior and the molecular structure of the synapse, using techniques borrowed from immunology and the basic sciences.

The Psychiatric Consultation/Liaison Service currently serves more than 4,000 patients per year in 11 inpatient units and 8 clinics. The child abuse program increased its service load by more than 60% in 1981 and by more than 20% in 1982. The Pediatric Psychiatry Service, one of the busiest in the region, continued to expand its work in service, education and research.

The Epidemiology and Mental Disorders Research Program is studying the role and effectiveness of New York State-financed acute day hospitals and the rehabilitation of the community support system for chronic mental patients in New York City.

An extensive outreach program by Psychiatry has been initiated to support New York State psychiatric centers in addition to the N.Y.S. Psychiatric Institute. This includes a new affiliation, with out-rotations by CPMC residents and medical students, as well as clinical in-rotations. During the rotations at the Medical Center, visiting residents attend formal educational seminars and participate in training programs in group, family and consultation-liaison psychiatry, as well as psychodynamics.

In addition, under its new affiliation with the Creedmoor Psychiatric Center, the Department is staffing a 70-bed special psychopharmacologic unit at Creedmoor for patients who have not responded to traditional therapies. And, with funds from the National Institute of Mental Health, Creedmoor and the Psychiatric Institute, Psychiatry is providing eight new two-year research fellowships.

The Department formally opened and dedicated the Lawrence C. Kolb Research Laboratories, a new 15-story research annex adjacent to the New York State Psychiatric Institute. The building, which has 75,000 square feet of research space and 10,000 square feet of support facilities, houses approximately 90 laboratories and specially designed facilities for research, teaching, conferences, computers, word processing and animal care.

In addition, two extensive programs were unveiled at the Medical Center's new off-

site doctors' offices at East 61st Street. One program will offer comprehensive evaluation of the full spectrum of psychiatric illness; the second will provide day care for patients recently discharged from inpatient care. Outpatient maintenance electroconvulsive therapy also will be offered.

Public Health

The School has continued its growth and developmentt with increased strength and vitality during 1982.

Its strategy to sustain but not increase student enrollment appears to be succeeding, largely through a restructuring of course schedules that allows and encourages part-time enrollment along with a strong effort to see that candidates are evaluated and notified promptly. Programs with other university schools have been strengthened through the development of joint courses and seminars, the appointment of coordinators, and extension into the areas of public affairs and international affairs. Formal relationships have been established with residency programs in preventive medicine at other metropolitan medical schools, and measures have been taken to allow health professions students in such schools to earn concurrent public health degrees here.

Major assets are the diversity and depth of faculty of national and international stature in a large variety of disciplines, and large numbers of applicants of outstanding intellectual caliber, with significant experience and previous professional training —both national and international.

The integration of the School into the Faculty of Medicine and its interaction with other units of the Medical Center and the Morningside campus provide myriad opportunities for faculty and students.

The curriculum has been examined carefully and revised to fit the change in public health priorities that has followed scientific and technological advances affecting health. Concerns over sanitation and waste disposal and the purity of water have shifted to the more current threats to the health of populations in industrial societies, including environmental contaminants, toxic chemicals and carcinogens. Other concerns include occupational hazards and the use of epidemiology as a means of helping to discover the cause of chronic diseases.

The shrinking world has made parasitic diseases a problem of many new populations. Tropical medicine has moved directly into immunologic and microbiologic research in parasitic diseases as a step toward understanding and controlling the problem of parasites.

Population and Family Health has expanded its focus on maternal and child health, as well as on population control, as a response to the problems of families both here and abroad.

Because the principles of public health are applicable to a wide variety of professional disciplines, the student body reflects great diversity in previous training and experience. Recent major decisions concerning part time attendance have made it possible for well qualified health professionals to get their academic credentials while continuing their professional work.

In conjunction with the Graduate School of Business, the Division of Health Administration has developed an intensive Management Administration Skills Institute to provide basic skills and experience for public health students and professionals enrolled in the Summer Session. The Division of Environmental Sciences has established a residency program in occupational medicine in conjunction with a New Jersey hospital and seven major industrial corporations.

The School has examined its joint degree programs with a view to strengthening its relationships with other schools of the University. Currently there are eight joint degree programs. Two new programs have been established with the School of International and Public Affairs—one in

international affairs and one in public administration.

Grant support, while more difficult to obtain and more competitive, has been successfully maintained with approximately eight million dollars in outside funding during 1981-82. This includes funds for the continuation and expansion of major research and service programs in this country and abroad.

Radiology

Radiology continued to develop and evaluate sophisticated imaging devices, including high-field nuclear magnetic resonance (NMR), positron emission tomography (PET), single positron emission tomography (SPET) and digital vascular imaging. Production of monoclonal antibodies and their possible uses in chemotherapy and as tracers also are under investigation.

Radiology raised more than $2.5 million from private industry and the National Institutes of Health to support its nuclear magnetic resonance project. NMR scanners differ from conventional computer tomography or PET scanners in their ability to detect fine gradations of tissue density without exposing patients to ionizing radiation. The new high field NMR scanners being developed at the Medical Center are expected to offer scientists an unprecedented view of tissue function as well as structure, using the most powerful imaging magnet ever built. It already has produced the first images ever of sodium distribution in the brain following a stroke. A larger superconducting magnet, expected to become part of a clinical high-field NMR scanner, has been developed, and clinical trials are expected to begin in 1983.

An improved PET scanner for laboratory use also has been designed. This scanner is an invaluable tool for pinpointing tiny areas of metabolic activity within a living organism, specifically within the central nervous system.

Other techniques for seeing into the body are being developed as well. The Division of Nuclear Medicine, in conjunction with private industry, has begun preliminary work on single photon emission tomography, a technique which uses low-level, short-lived radioisotopes. Also being conducted in collaboration with industry are clinical trials of digital angiography to enhance the visibility of flow through blood vessels.

This technique is less invasive than conventional procedures. Because it requires less contrast media than in the past, the possibility of adverse reactions also is significantly reduced.

Research in ultrasound continues, using a computer to reconstruct cross-sectional and three-dimensional images of the heart. When perfected, this technique will provide an accurate, noninvasive way to calculate the volume of the heart's chambers. Efforts to further refine ultrasound techniques by computer processing also are being studied.

As radiologists have found increasing therapeutic uses for diagnostic radiological techniques, a new subspecialty has emerged: interventional radiology. Techniques now are being used to drain abcesses, remove stones from the biliary tract, take needle biopsies of tissue from almost any part of the body, relieve jaundice by opening obstructed bile ducts, and open clogged or partially clogged blood vessels—all without surgery. The clinical success of the latter technique has been extremely promising, and, in some cases, the procedure is an acceptable alternative to bypass surgery.

With a gift of $1 million, the James Picker Professorship in Radiology has been created. The Department is committed to raise enough money, with the help of alumni and friends, to create a second endowed chair—the William B. Seaman Research Professorship.

Rehabilitation Medicine

1982 was a year of considerable activity in research, teaching and clinical programs.

Studies continued in thermoregulatory and endocrine changes associated with menopausal "hot flashes." Assessment of the role of microcirculation on heat transfer in animals is underway. Preliminary results have suggested that thermal equilibration occurs long before the blood reaches the capillary bed, contrary to the present belief that it occurs in the capillary bed.

Studies of the origin of gamma aminobutyric acid in the brain and in other tissues are being conducted. Research into the functions of polyamines in nerve and muscle, especially as they relate to the activity of transglutaminase, is ongoing. These studies relate to the modifi-

cation of proteins associated with aging.

Researchers also are studying the integrity of the autonomic nervous system in normal aging and in disease states such as Shy-Drager syndrome, Parkinson's disease and Alzheimer's disease. These studies include assessment of some of the physiological and biochemical measures of autonomic nervous system function, such as blood flow, sweating, cardiovascular changes, skin resistance, and plasma catecholamine and polypeptide levels.

The pain study research project continues with emphasis on the investigation of the effect of electrical pain on somatosensory cortical and peripheral evoked responses.

In addition to their research activities, staff members taught the physician-patient relationship course and assisted in the gross anatomy laboratory for first year medical students. Rehabilitation Medicine staff taught second year students in an Introduction to the Patient course. The Summer Student Fellowship Program in Rehabilitation Medicine sponsored by the J.M. Foundation successfully concluded its sixth year. Sixteen students in their first and second years of training spent the major portion of their time at the Medical Center. They also visited other facilities, receiving an introduction to the concept of comprehensive patient care and acquiring skills, attitudes and sensitivities which will be useful to them throughout their medical careers. As an indication of its success, the postgraduate training program continues to attract former P&S students who have completed the fellowships.

Major innovations in clinical activities have included monitoring spinal cord integrity using evoked potentials during surgery. This technique allows the surgeon to know, while the patient is still under anesthesia, if the integrity of the spinal cord has been compromised.

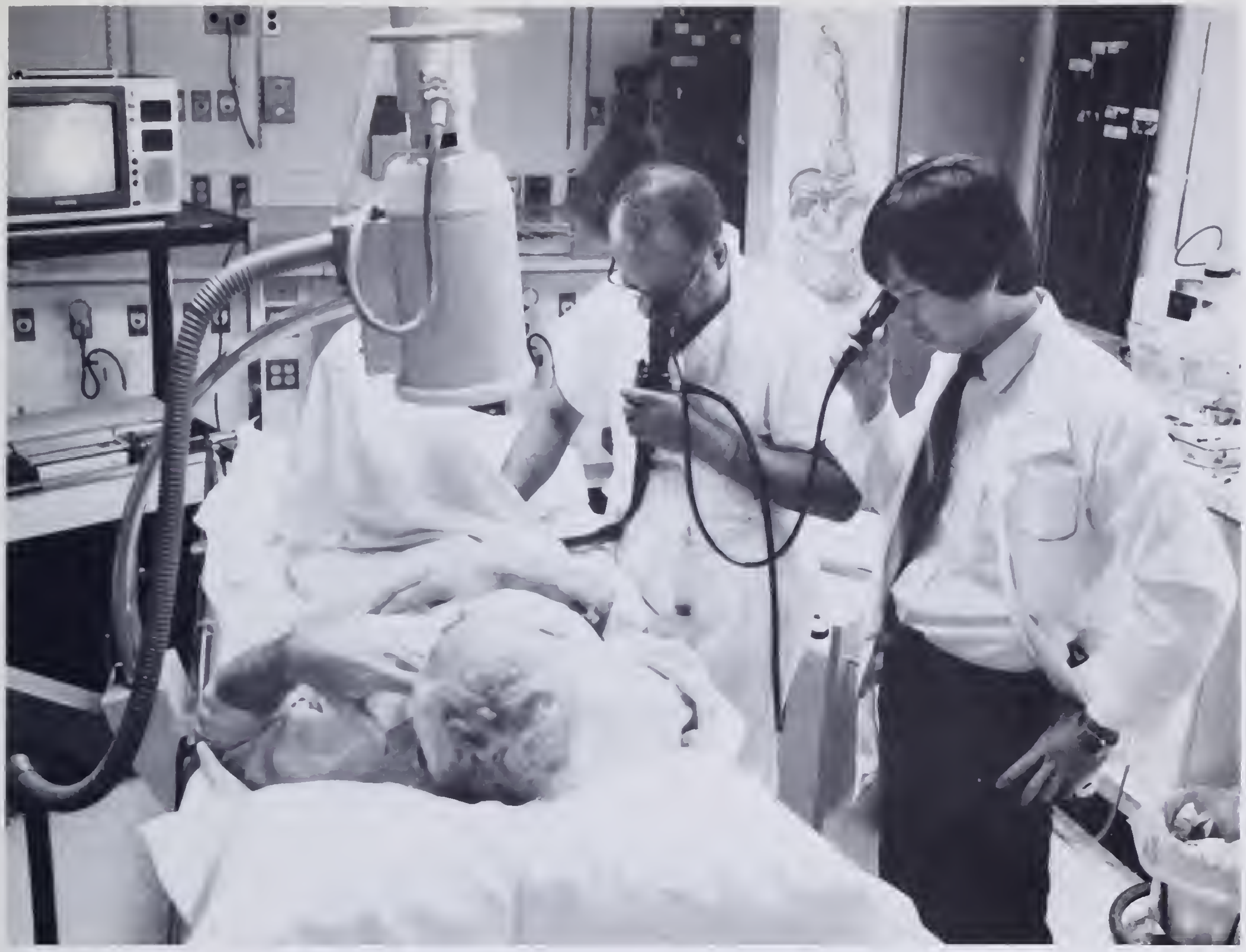
New and expanded clinics have been started in orthotics/wheelchair prescription, electromyography and muscular dystrophy.

Results have been highly successful in specialty board examinations. The residency training program is achieving national recognition for its teaching. This year it received more than three hundred applications for two positions.

Changes in curriculum are reflected by the inclusion of pediatrics and gerontology in the clinical context of the final semester, allowing students to apply their knowledge of mental health problems and physical disabilities to patient populations grouped by age rather than by disability.

Fund raising is being vigorously pursued in the hopes of receiving grants for program development and scholarship aid, and the annual appeal to alumni continues. Previous funds received have permitted the establishment of the Franciscus Fund. The Alumni Committee decided to set aside part of these monies as a revolving fund, to be used for student aid and to be replenished each year.

The Bureau of Labor Statistics has issued a report stating that, of eighty professions assessed for growth within the next decade, physical therapy ranks ninth overall and first among health care professions. The first Master of Science class was graduated in May 1982. The Master of Science Physical Therapy Program was granted



full accreditation by the American Physical Therapy Association. Faculty has been increased by two members: one to supervise the research component of the curriculum and one as coordinator of the clinical education phase. Faculty members continue educational research projects designed to evaluate the effectiveness of the Maniken anatomic model as a teaching tool for gross anatomy. They also have participated in numerous continuing education programs.

The occupational therapists have established a weekly in-service program to include staff OTs, students and guest lecturers. Staff OTs continue to teach. An arthritis group has been started for patient education, emphasizing energy conservation, joint protection and techniques to be utilized for everyday activities. A therapist was hired to attend the Muscular Dystrophy clinic.

Physical therapists also saw patients in the newly opened Muscular Dystrophy Clinic. Enhancement of the pediatric rehabiliation program was realized by space renovation. The area where orthopedic physical therapy is located is to be expanded, and the physical therapy area is undergoing partial renovation to accommodate the cardiopulmonary services and hydrotherapy. Staff therapists attended a cardiac rehabilitation conference, with participants from internal medicine, rehabilitation medicine, cardiology, and physical and occupational therapy. Special programs continue, such as the mastectomy program, cardiopulmonary therapy, and back care for employees, as well as programs for amputees and multiple sclerosis patients. The infant stimulation program in our newborn intensive care unit continues.

Surgery

Surgery has continued its commitments to clinical excellence, resident training, recruitment of new faculty, and clinical and basic research.

The opening of our new centralized surgical units has significantly improved patient comfort and staff convenience. Final

arrangements are being completed for the opening of offices in midtown Manhattan and members of the surgical staff have committed themselves to participate in this project.

The residency program attracts graduates of the most outstanding quality from around the country, and Surgery continues to receive more than 20 applications for each available position. Five additional first year resident positions for a single year of surgical training have been offered for the last three years and the demand for these positions has exceeded all expectations. The residents completing this one year training program since 1980 have strongly endorsed the program, and a high level of enthusiasm exists among current applicants.

Our graduate students continued to seek residencies in surgical training programs in numbers far exceeding the national average. The Department is gratified by this as well as by the interest generated by our own residency program.

Four new faculty members joined Surgery in 1982, including a new chief of the division of plastic surgery. These appointments are additional signs of our commitment to attract younger staff members with demonstrated clinical and investigative skills. Faculty members currently are performing basic and clinical research in vascular surgery, myocardial metabolism, endocrine surgery, surgical metabolism and laser therapy.

The cardiac transplantation program is expanding rapidly and is expected to develop into the referral center for the entire northeast in the near future. It is anticipated that with the adoption of newer immunosuppressive protocols this form of therapy will emerge as a standard treatment option.

Urology

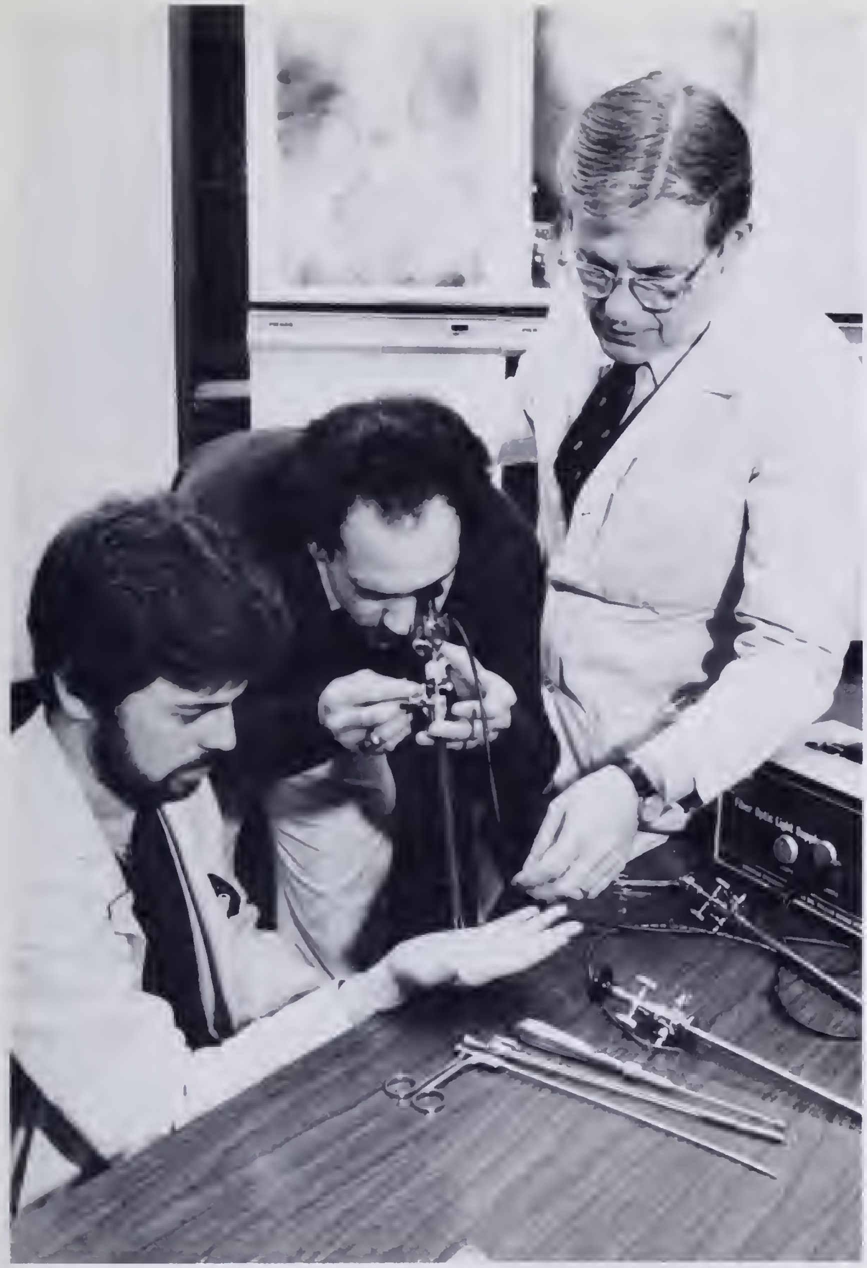
This was an extraordinarily active year for Urology, particularly in the areas of research and new program development.

New clinical programs included the Neurourology Referral Center for inpatients and ambulatory patients with neurologically based retention or voiding problems. A grant from the Multiple Sclerosis Society will allow scientists to continue working toward a better understanding and treatment of MS.

In 1983, a center for the study and treatment of urinary stone disease will be fully operational. While the program will emphasize prevention, stones often recur that sometimes require surgery, particularly if they form in a kidney. Soon, however, most kidney stones will be removed through the skin; ultrasound will be used to pulverize large stones prior to removal.

In the surgical treatment of renal cancer, various techniques will allow doctors to salvage as much kidney tissue as possible when a tumor is removed, which is particularly important when kidney function already is compromised or when the patient has only one kidney.

The New York Male Reproductive Center, which opened in 1981 as part of the Institute of Human Reproduction, continued its clinical programs and expanded its research activities. It has been known that damage to one testicle often results



in sympathetic disorders in the opposite testicle that can lead to infertility. Studies have demonstrated that this process is related to the immune system, and immunosuppressive medication may prevent it in adult males.

In addition, automated cell sorting equipment is being used as an early warning system to monitor the effects of radiation and chemotherapy, so that dosages can be adjusted before these therapies cause permanent testicular damage and sterility.

Automated cell sorting also is being used to evaluate bladder and prostate tumors and their response to therapy and to determine rapidly whether tumors are likely to recur or invade healthy tissue. This apparatus also can detect small improvements soon after the administration of hormones or chemotherapy rather than after the usual three or four months. Cell sorting may be useful for the evaluation of colon cancer and other cancers as well.

Microscopic and electron microscopic examination of prostate cancer cells resulted in a new system which is apparently highly accurate in predicting clinical outcomes.

Researchers here are evaluating a method of transplanting hormone-producing cells from one species to another by encapsulating the cells in micropore plastic containers to prevent tissue rejection. This type of transplantation, if successful in humans, would eliminate the need for hormone injections in patients with insufficient adrenaline production, diabetes, or similar complications.

Researchers are hopeful that work on the genetic level will help scientists understand abnormal embryo development and many congenital abnormalities. Urologists are trying to learn how abnormal genetic messages encoded in cancer cells are "turned off" when they are introduced into the DNA of embryo cells. This study will take many years to complete, however, because all the genes must be analyzed one by one.

Investigators here have found a way to introduce abnormal genetic material into cells without interfering with the cells' normal chromosomes. This knowledge may one day lead to a technique for replacement of a deficient gene in a cell, without altering the cell's normal genetic content and/or function.

Researchers also identified a gene responsible for the development of bladder cancer in animals, and similar work with testicular cancer is underway. By manipulating the genetic material in tumor cells, investigators hope to determine whether various cancers are caused when a normal gene undergoes minute chemical changes or whether they result from relocation of genetic material.

Others have recently discovered that DNA in a prostate cell has a specific site to which the hormone testosterone can bind, which should help urologists predict which prostate cancers will respond to hormones and why some lose the capacity to respond. It may help urologists enhance hormone therapy, since many prostate cancers depend on testosterone to survive. This work may also help to further elucidate how hormones work in normal tissues as well as in cancer, and may pro-

vide data that could be applicable to the understanding of a number of other diseases.

Monoclonal antibodies that "recognize" and attach themselves to cancer cells may be used to detect metastases even when they are too small to be discovered on a CT scan or through other imaging techniques. Researchers have begun to attach radioactive molecules to monoclonal antibodies and track these tags to cancer which has spread beyond the prostate gland. Applying similar principles, cancer-killing drugs may soon be directed selectively to cancer cells by monoclonal antibodies instead of bathing the entire body in these toxic drugs.

The Department also was involved in experimentation with new agents that will sensitize tumors to radiation and chemical attack.

CPMC urologists occupied numerous positions of leadership in various national and international societies, and on various publications. In addition, outstanding graduate and undergraduate programs have attracted a large pool of talented applicants from around the country.

Center for Neurobiology and Behavior

The brain is the most complex of all animal tissues, and its major function—the generation of behavior—needs to be approached with a wide-ranging variety of experimental techniques. The Center has been emphasizing study of brains of invertebrates which contain relatively few nerve cells, as well as simple behavioral systems such as sensory and motor "programs" in the complex brains of vertebrates. In each case the brain mechanisms of behavior are studied with the techniques of modern cell biology. The simplicity of the experimental systems used in the Center allows data from nerve cells to be related directly to behavior.

During the past year, two events have substantially improved the teaching and research capabilities of the Center. One is its move to the newly completed research facilities of the New York State Psychiatric Institute. The Center now occupies two floors of the new Lawrence C. Kolb Research Laboratories where its various laboratories—for the study of behavior, neurochemistry, cell biology, biophysics, morphology and developmental neurobiology—have contiguous space. The Center also has been able to add a new laboratory focusing on molecular genetics of the nervous system.

The members of the Center, in collaboration with other neural scientists here, have published a textbook entitled *Principles of Neural Science,* which is being widely adopted by medical schools and graduate schools throughout the country. *Principles* has won the American Medical Writers Association Book Award for 1982.

Comprehensive Cancer Center/ Institute of Cancer Research

The revision of the Center's organizational structure, instituted in 1981, has encouraged a greater multidisciplinary research effort based on goals and interest rather than traditional scientific categories. The major divisions now emphasized are basic research, clinical research and patient care, carcinogenesis and molecular epidemiology, education and control.

The Institute and the Comprehensive Center remain separate organizationally but the activities of Institute scientists are an important part of the integrated structure of the Center. As a basic research-oriented organization, the Institute has taken a varied and multidisciplinary approach to help increase our understanding of cancer and its control. Programs include viral oncology, chemical carcinogenesis, immunological aspects of cancer, and mechanisms of cell regulation.

Since all faculty members have appointments in "home" academic departments such as Biochemistry, Human Genetics and Development, Medicine and Pediatrics, the Center's relationship to the various disciplines is close and active, augmented by two Research Advisory Committees representing all clinical and basic science departments.

Clinical activites are concentrated in the Oncology Divisions of Medicine and Pediatrics. Psychiatry is called upon to instruct medical house staff and oncology fellows about the psychiatric problems of hospitalized oncology patients.

In clinical research the focus has been on combined chemotherapy, chiefly a three-drug regimen, for a variety of neoplasms, including cancers of the breast, ovary, head and neck, pancreas, prostate and bladder, and for advanced lung cancer and carcinomatous meningitis. The diphosphonates, originally investigated here for potential usefulness in Paget's disease, now are being widely studied for therapy of various diseases including cancer. New programs have been initiated in leukemia and malignant melanoma embodying chemotherapy of drug-resistant residual cells; immunological diagnosis and therapy using monoclonal antibodies, and cell biology of normal blood cell differentiation and leukemic transformation. In collaboration with other institutions, we are investigating the use of human leukocyte interferon in multiple myeloma; early results suggest it may be useful but not as a primary therapy. Evaluation of high-field nuclear magnetic resonance is expected to lead to early detection and noninvasive study of cancer.

Cancer control efforts have been concentrated on developing regional activities within the service area comprising the upper west side of Manhattan and the northernmost counties of New Jersey. A computerized system for patient management, utilizing cooperative protocols, will be instituted in several community hospitals. In the psychosocial area, programs are being developed for the assessment of stress in chemotherapy, support and coping mechanisms and various techniques of coping among health professionals who deal with cancer patients. An active and productive occupational health/preventive oncology program is currently concerned with assessing risks among shipyard welders, hospital workers exposed to ethylene oxide, as well as physical therapists who are exposed to microwaves.

The method of RNA-DNA hybridization developed at the Medical Center is one of the most useful of all techniques for the study of viral oncology. Present studies are focused on the adenoviruses, herpesvirus, Epstein-Barr virus, avian sarcoma virus, and mouse mammary tumor virus. Development of cloned cell lines from breast cancer patients, with preparation of antisera to the cells, offers hope for the first time of an appropriately sensitive diagnostic test for this disease.

Major research efforts in cancer immunology are focused on myeloma and other plasma cell dyscrasias and on T cell

immune response. A new system for mutagenesis testing is being evaluated to see if it can be valid as a kind of mammalian cell Ames test.

Researchers in cellular and molecular genetics are using a variety of approaches and systems to explore such vital areas as gene expression, mutation, viral replication and regulation, control of transcription, and neoplastic transformation.

The molecular basis of environmentally linked cancer is being explored by an interdisciplinary team that has identified a critical step in the mechanisms of pollutant-linked carcinogenesis and has developed rapid assays that can facilitate detection of chemical carcinogens and tumor promotors in the environment.

Sergievsky Center

The Center is now in its fifth full year of activity and is firmly established. Faculty are actively engaged in interdisciplinary research and teaching with the Departments of Human Genetics and Development, Medicine, Neurology, Obstetrics and Gynecology, Pediatrics and Psychiatry, and with the Divisions of Epidemiology and Biostatistics in the School of Public Health. Faculty hold joint appointments with several of these departments. They also contribute substantially to the teaching of epidemiology in the medical school and in public health. The Epidemiology of Brain Disorders division of the New York State Psychiatric Institute is located in the Sergievsky Center and fully integrated into its research and teaching activities, thus giving the Center a solid connection with that Institute.

Research continues in three broad categories: the determinants of seizures; the prevalence, antecedents and consequences of other neurodevelopmental disability and handicap, and the origin of congenital defects.

Descriptive studies of seizures based on data from Rochester, Minneapolis and New York City have produced the striking finding that the recurrence rate after the first seizure is no more than 30 percent in the first 30 months. A study of first seizures among the population of Harlem, funded by the National Institute of Neurological and Communicative Disorders and Stroke, is one of the few investigations of epilepsy of any type among blacks in America. Other studies are concerned with familial transmission and psychosocial and physical factors precipitating seizures and with attempts to improve the rehabilitation of New York City Hispanics with epilepsy.

Development disability and handicap studies are chiefly concerned with the impact of newborn intensive care on the ultimate prevalence of neurodevelopmental handicap. Other research is focused on intraventricular hemorrhage in the newborn, the role of smoking in prematurity, controlled intervention to prevent prematurity, and the significance of so-called soft signs in assessing minimal brain damage Faculty are conducting field work in 10 nations in an attempt to provide knowledge about the distribution and causes of neurodevelopmental handicap in Third World countries.

Study of origins of congenital defect are concentrated on spontaneous abortions, with support from the National Institute of Child Health and Development. Among many aspects of this problem, the research will examine the validity of a new test of early pregnancy being developed in the Department of Medicine.

Teaching is an important and valued component of the Center's activities. Faculty members teach courses in the School of Public Health in various disciplines, in the Milbank Health and Society Program at Barnard College, and in Medicine and Pediatrics Center faculty also are responsible individually and on committees for the supervision of graduate students in epidemiology in several divisions.

International Institute for the Study of Human Reproduction

The Institute consists of three centers: the Center for Reproductive Sciences, the Center for Population and Family Health, and the New York Male Reproductive Center.

Assembled at the Center for Reproductive Sciences is an interdisciplinary group of investigators devoted to the study of biochemical and physiological aspects of reproduction, neuroendocrinology, female and male reproductive endocrinology and the genetics and molecular biology of reproduction. In this past year, the Center was particularly active in the areas of molecular biology, genetics of reproduction, primate neuroendocrinology, fetal central nervous system differentiation and steroid biochemistry.

In cooperation with the Division of Ambulatory Care in Obstetrics and Gynecology, the Center for Population and Family Health provided a wide range of services at home and abroad. In addition to operating programs in many developing countries, the Center's Reproductive Health Services for Women Unit provided care for women in the Washington Heights/Inwood community. These programs focused on new approaches to the delivery of family health services here and in the developing world, where the emphasis is on rural populations.

The New York Male Reproductive Center is a multi-disciplinary program for the diagnosis and treatment of male reproductive and sexual disorders—in particular, infertility and impotence.

Institute of Human Nutrition

Research and education occupied positions of equal importance at the Institute in 1982. A significant amount of valuable information has been learned through experimentation, and these discoveries are being shared with the Institute's students and the lay public.

Research continued in the areas of

physiologic and biochemical adaptation to malnutrition; the relationship of nutrition to pregnancy; the effects of smoking, alcohol and coffee consumption on fetal development; central nervous system development, including the role of N-acetylneuraminic acid in brain function; the effects of diet on cellular immunity; the development of a new model for genetic obesity; the relationship between nutrition and aging, in particular, the effects of protein intake on RNA and protein metabolism, mental function, thermal regulation and cell-mediated immunity; and the role of endorphins in appetite control.

A Clinical Nutrition Research Unit, jointly staffed by members of the Institute and Pediatrics, added a major clinical component to the activities of the Institute. The unit provided various services, including nutritional assessment and an intravenous nutrition unit for newborn infants. Many research projects with direct clinical applications have begun, including investigations of amino acid and lipid metabolism in intravenously fed infants, the nutritional status of patients with cystic fibrosis, and metabolic adaptations to pregnancy.

Institute faculty continued to teach a required nutrition course to first year medical and dental students. Graduate students were provided with a relevant selection of classes, including specialty courses, such as basic nutrition, infant nutrition and nutrition and hormone action.

The Institute continued to devote much of its efforts to public health education, as well as undergraduate and graduate medical and dental education. The daily radio program, Columbia Nutrition Bulletin, is now being aired by 200 stations in the U.S.A. and abroad. The *Nutrition and Health* newsletter, in its fourth year, continued to command a large audience. This publication has provided the basis for a series of nationally distributed books, the first of which, entitled *Diet and Nutrition Program for Your Heart,* already has been published. Other ongoing programs included an annual symposium and involvement by the faculty in a Mead Johnson-funded teaching program in pediatric nutrition for health professionals. In addition, the Institute began offering a referral service for dietary counseling and assessment.

Auxiliaries

The hard work and generosity of the Auxiliaries again have funded a variety of hospital services.

Their continued support ensured another successful year of operation for the Gift Shop. For those patients in the Presbyterian building and Harkness Pavilion who could not visit The Shop, a Shopping Cart sponsored by the Presbyterian Hospital Auxiliary went out to the floors. Contributions to the Social Work Services Department by the PH Auxiliary made possible stipends for graduate social work trainees. The PH Auxiliary also supported adult recreational therapy and the Milbank Library. The Auxiliary's main source of revenue is the Stuyvesant Square Thrift Shop. Income from the Thrift Shop and other projects allowed them to make generous contributions to departments throughout the Hospital totaling more than $30,000.

The Neurological Institute Auxiliary received a significant part of its income from the Everybody's Thrift Shop, which allowed its members to pay the salaries of two recreational therapists, redecorate three of the Neurological Institute solariums; partially support the Stroke Club; and present awards to some exceptional employees.

The Board of Women Managers of Babies Hospital also continued to nurture the Parents for Parents Program. In addition, they supported the Recreational Therapy Program and Therapeutic Nursery, both of which attracted First Lady Nancy Reagan during a visit in October.

FINANCIAL SUMMARY: THE PRESBYTERIAN HOSPITAL

In 1982, The Presbyterian Hospital saw more patients and, to an extent because of this, incurred greater operating losses than the previous year.

The number of ambulatory visits increased from 686,184 in 1981 to 698,492 in 1982. Among these visits, 423,020 were treated in the clinics, groups and emergency room at the Vanderbilt building. This is an increase of approximately 7,500 over 1981. Included in these figures were increased numbers of visits by poor patients receiving Medicaid assistance and others with no coverage at all. As a result of the free care we provide, as well as depreciation which is not reimbursed in a timely manner, the 1982 loss from operations—$7.8 million—was up from $7.3 million in 1981.

Although operating expenses exceeded operating revenues, non-operating revenues were nearly a million dollars greater this year than they were in 1981, resulting in a surplus of $1.2 million (double the surplus in 1981) and in additions to property, plant and equipment of over $23 million—up from $17.6 million in 1981. As result, our fund balance as of December 31, 1982 stood at $126,559,000. This compares favorably with $114,466,000 in 1981.

On the inpatient side, the number of patient days was slightly higher, at 388,668.

In 1982, the State of New York recognized that The Presbyterian Hospital and other urban hospitals throughout the State provided a disproportionate amount of free care to the medically indigent. In order to compensate us for the multimillion dollar losses we incur in providing care to those who cannot afford it, a pool of funds was established from which we expect to draw hundreds of thousands of dollars in 1983.

However, this is only a partial solution, since at no point can we expect to recover the full cost of providing free care to the community. Until government on all levels recognizes that teaching hospitals help solve important societal problems not of their own making, and until they begin to compensate them adequately for doing so, we will continue to find it difficult to reinvest sufficient resources for our future and the well-being of our patients.

Financial and Statistical Review*

The Presbyterian Hospital in the City of New York Statements of Revenues and Expenses and Changes in Unrestricted Fund Balances for the Years Ended December 31, 1982 and 1981

(In Thousands)

	1982	1981
Operating Revenues:		
Patient service revenues	$232,211	$205,496
Allowances and uncontrollable accounts	(29,488)	(26,700)
Net patient service revenues	202,723	178,796
Other services	12,129	11,159
Transfers from specific purpose funds	4,261	4,431
Total operating revenues	219,113	194,386
Operating Expenses:		
Salaries and related fringe benefits	147,777	134,759
Supplies and other expenses	66,674	58,065
Depreciation	12,456	8,883
Total operating expenses	226,907	201,707
Loss from Operations	(7,794)	(7,321)
Non-operating Revenues:		
Investment income	6,719	6,132
Legacies and contributions	1,980	1,664
Realized net gain on sales of investments	249	168
Total non-operating revenues	8,948	7,964
Revenues Over (Under) Expenses	1,154	643
Fund Balance, January 1	114,466	105,148
Transfers from (to) Restricted Funds for:		
Additions to property, plant and equipment	23,395	17,558
Funding of depreciation	(12,456)	(8,883)
Fund Balance, December 31	$126,559	$114,466

In-Patient Statistics	1982		1981	
	Adult Pediatric	Newborn Nursery	Adult Pediatric	Newborn Nursery
Average Bed Complement	1,218	59	1,241	59
Patient days	388,668	15,602	388,380	14,873
Admissions	41,741	3,809	42,204	3,514
Average length of stay	9.29	4.29	9.16	4.41

Outpatient Statistics	1982	1981
Number of Visits		
Medicaid	175,742	173,487
Medicare	74,784	78,171
Blue Cross and Blue Shield	7,780	7,344
Self pay	139,463	136,649
Personnel and dependents	25,251	19,888
Total	**423,020**	**415,539**
Doctors Offices	**275,472**	**270,645**
Grand Total	**698,492**	**686,184**

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*A complete financial report can be obtained by writing the Finance Department, Presbyterian Hospital, 622 W. 168 St., New York, NY 10032.

Columbia University's fiscal year ends June 30. Requests for information may be directed to the Office of the Controller.

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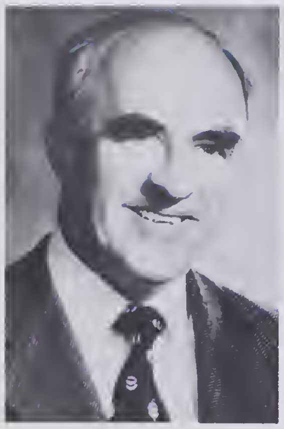

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Pharmacologist
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